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Buyers Guide
p334

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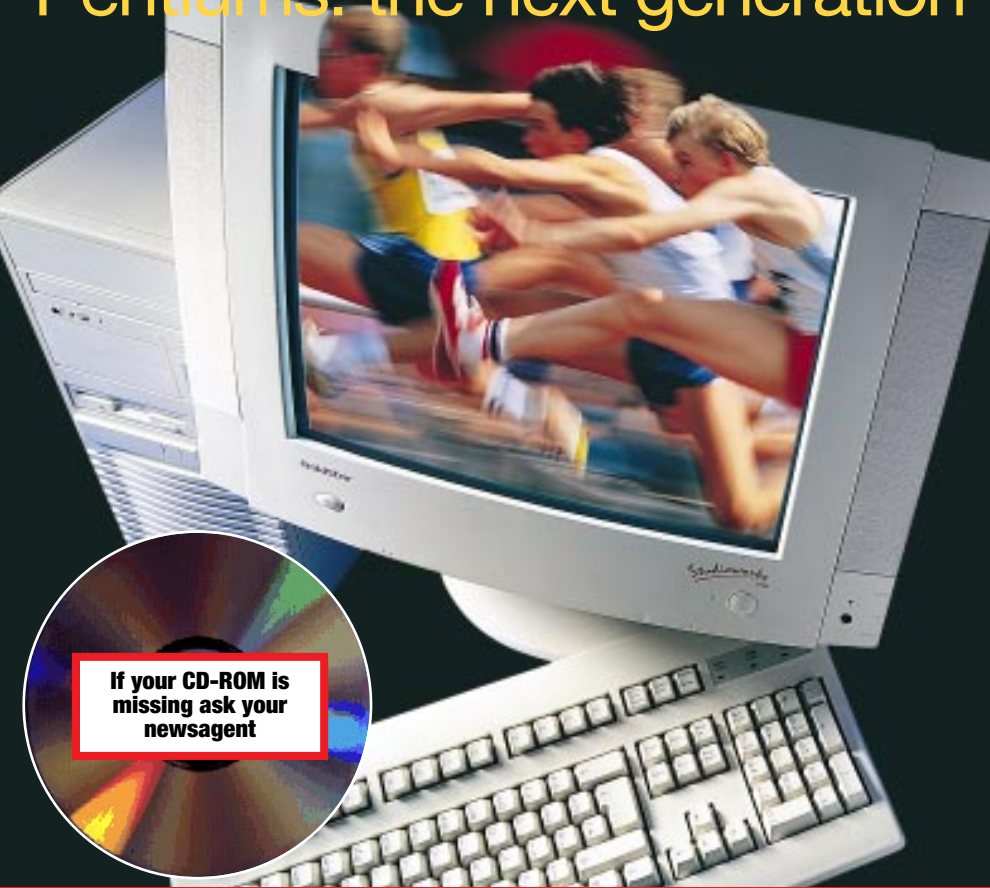
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March 1997

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MMX Appeal

Pentiums: the next generation



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12 Palmtops on test

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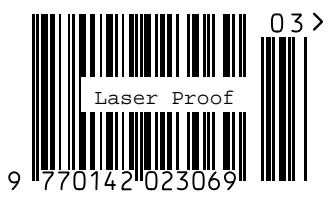
COMPETITION

2 ADI
Multimedia
Packs to
be won



Reviewed: Borland C++
Builder, Sun's Javastation,
Norton Utilities

2.0,
Visual
Basic 5



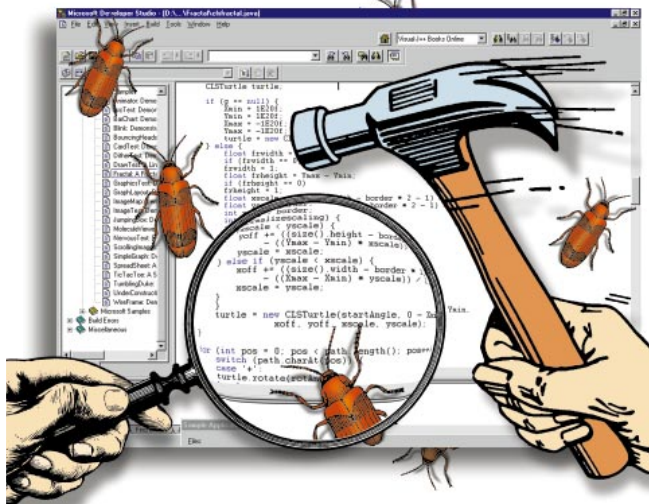
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Visual Programming
9 TOP TOOLS TESTED

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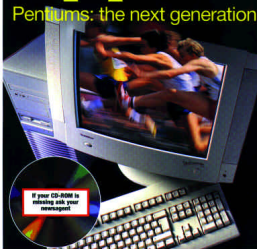
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Advertisement typesetting by Typematters, London N1.
Origination by Latent Image West, 9 Bridle Lane, London W1.
Printed and bound in the UK by St Ives plc, Plymouth.
Distributed by Comag, Tavistock Road, West Drayton, Middlesex (01895 444055).

BPA 143,615
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Editorial

There's no doubting that Mac users are a vociferous bunch. We have received letters complaining about our "negative comments" towards Apple in recent issues, so perhaps some clarification is needed here.



Microsoft and Intel's products do a good (enough) job and dominate modern computing through a combination of luck and, in Microsoft's case, marketing skill. That is the market in which we work and so must cover it while simultaneously following new trends and developments such as the rise of the intranet and Java-

based computing. Currently, none of the emerging trends have been instigated by Apple. It has become a follower.

We are not in the business of putting the boot in to Apple; instead, we report and analyse its activities, the most recent of which do not inspire confidence. Loyal Mac users might feel heartened to see Steve Jobs back at Apple. Wall Street was clearly less so, with the stock price falling after the NeXT merger announcement (see *Newsprint p27*). Copland is cancelled and a brand new OS, based around NeXTStep, is to be developed in about two years which, initially, won't run existing Mac applications. Does that makes sense? The new OS Apple develops might indeed be dazzling, but it is asking a lot of Mac users to bin all their existing applications or wait for the promised compatible version.

Two years is a long time in computing. By the eve of the millennium, Microsoft will have polished Windows way beyond its currently rather schizophrenic state, Java-based computing will be established, while Mac users will be soldiering on with a creaking OS dating back to 1984.

Right now, Apple's future seems set on a niche OS vendor for high-end multimedia developers and graphic designers. That is, those who have not switched to Windows NT, or even BeOS.

■ It is that time of the year when we ask for your help in choosing the recipients of the coveted PCW Awards trophies. You will find this year's form on page 152. All we ask is that you fill it out and send it back to us. Or you can vote directly on our web site. Your votes count and this year's awards are the biggest ever, so don't miss out.

PJ Fisher

Managing Editor

Next Month

PCW Group Tests give you the best of both worlds as we test PCs and notebooks.



Bargain PCs

Is it possible to get a high-performing P133 for under £1,000? Ten PCs are on our shopping list.



On the road



Eight quality notebooks fight it out for the top spot.

Awards

Your chance to vote in the



Personal Computer World Awards and win a great prize.



Plus...

A first look at Lotus Domino 4.5 and a round-up of personal finance packages.

April '97 issue

■ On sale Thursday 6th March

May '97 issue

■ On sale Thursday 3rd April

* Next month's contents subject to change.

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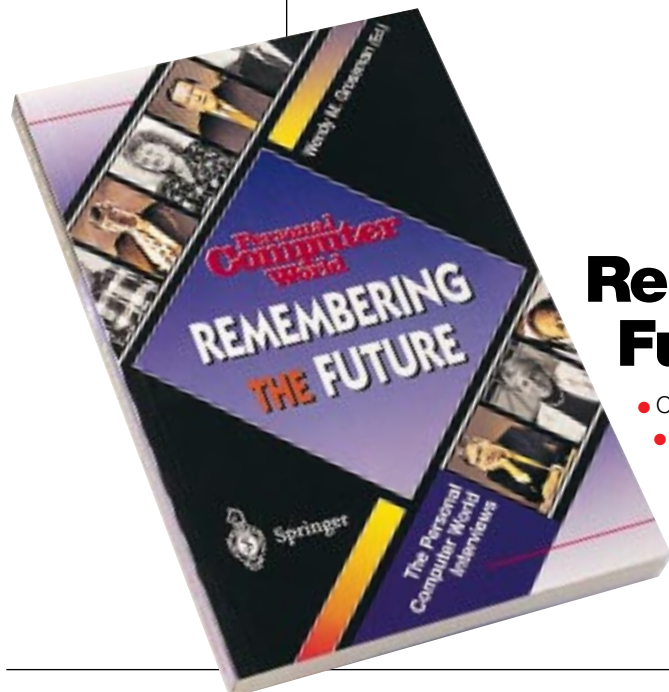
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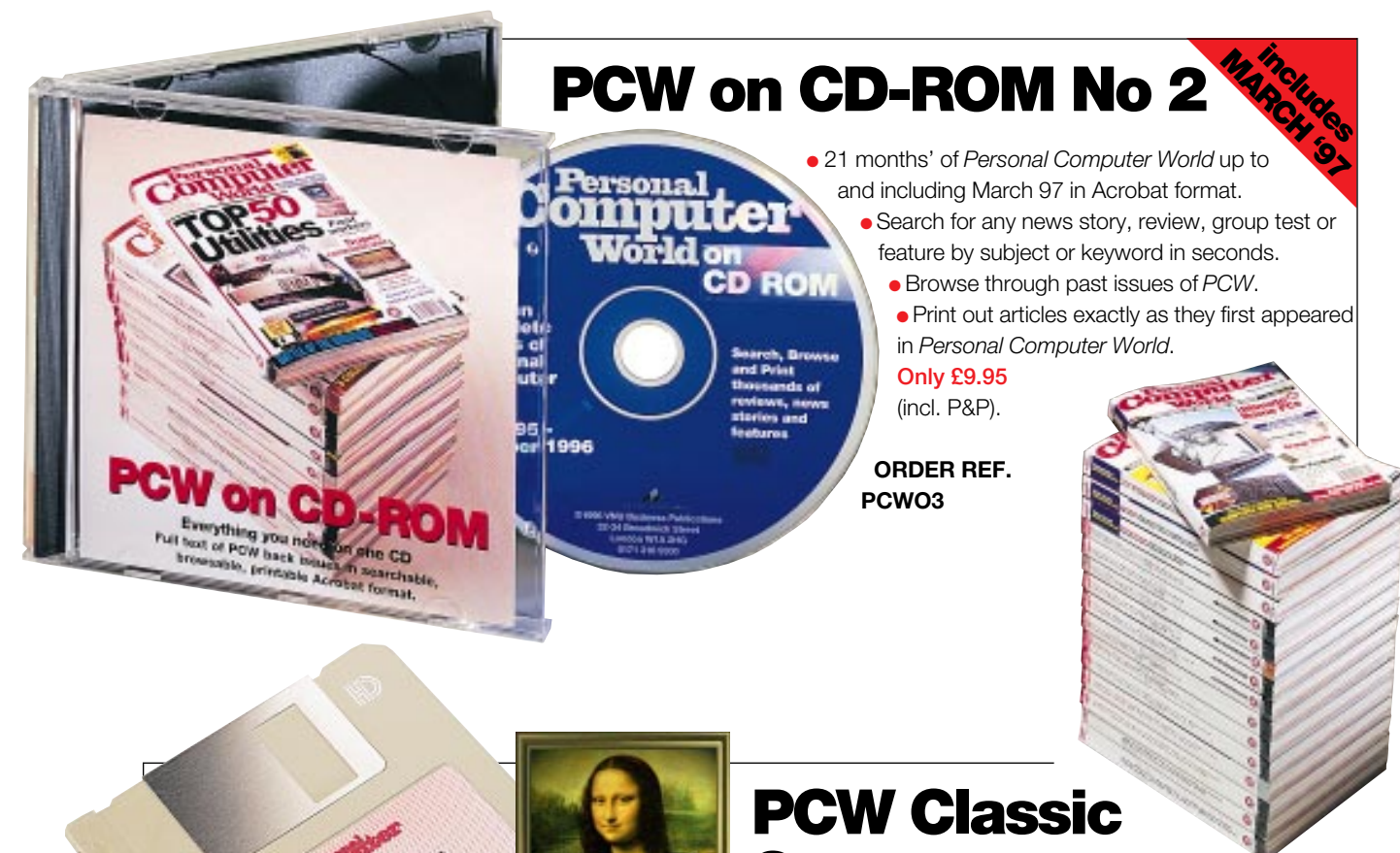
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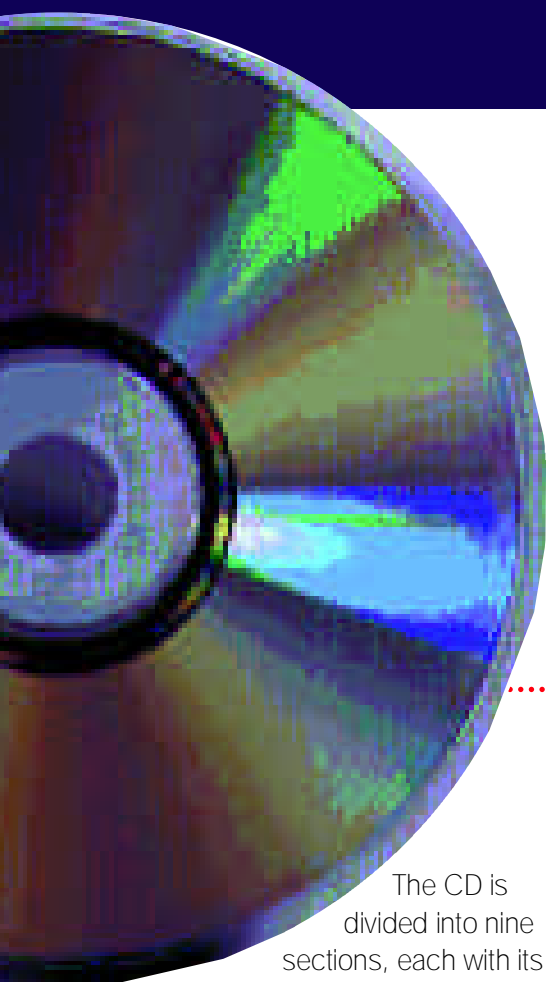
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**Personal
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March Cover disc

Read what's in issue 7 of our new-look PCW CD-ROM. As usual, there's more than 600Mb of top-quality games, music, videos and multimedia for you to enjoy.

The CD is divided into nine sections, each with its own icon. Each of the nine section buttons is almost always visible on-screen so you can move from section to section just by clicking on that button, rather than having to continually return to a home page. If you are not sure where each section is, roll over the buttons and the name of that section will be displayed along with a contents list for the section. Exit the disc by clicking on the "Q" in the bottom left of the screen.

Arts

An interactive Jukebox containing the track Lucky Star by Triggerfish, and the third part of the interactive sci-fi comic, "Zamak", by Denevo. Plus thirty-two 24-bit colour images from the Image Bank

Games

Here you can preview the three featured games on this month's CD. Some you can play straight away, others you'll need to install first or can only play from DOS.

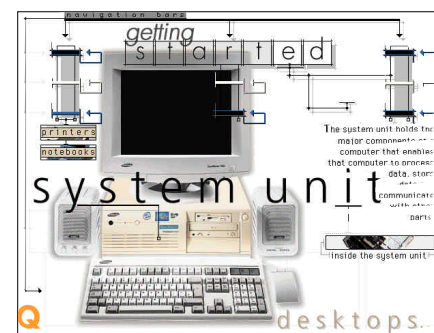


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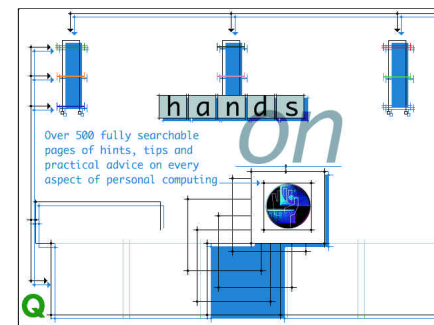
Getting Started

A beginner's interactive guide to notebooks, printers and desktop PCs.

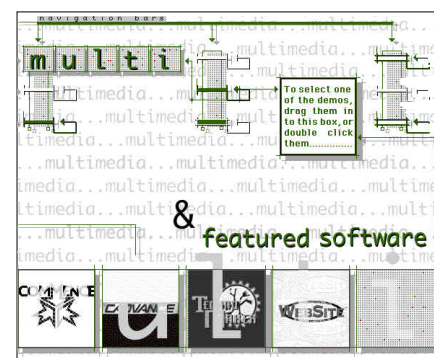


Hands on

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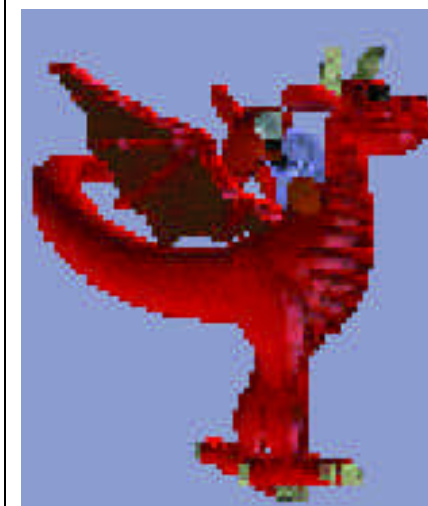
Multimedia



Three interactive Windows demos for you to enjoy.



Floppy disk



directory <CD Drive>/FLOPPY/ This will create a directory on your hard disk called FLOP0397* which will contain the sub-directories BMAPRO, PEAS, VOXEL, and K95SETUP. Note: The files to launch/install the four programs are named wrongly in our installer from the CD-ROM. Please see below to see the right files to double-click.

BMAPRO (Windows 3.X / Windows 95) To set up this program, double-click on C:\FLOP0397*\BMAPRO\BMAPROSW.EXE
PEAS (Windows 3.X / Windows 95) To set up this game, double-click on C:\FLOP0397*\PEAS\INSTALL.COM
VOXEL (Windows 95) To set up this program, double-click on C:\FLOP0397*\VOXEL\VSSEVALW.EXE
K95SETUP (Windows 95) To set up this screensaver, double-click on C:\FLOP0397*\K95SETUP\K95SETUP.EXE
 (* default directory name)

This month's PCW floppy contains four separate programs. There is a Billing Manager Application (FF Billing Manager Pro), a game (Veripeas), a VB3 3D Viewer (Win95 only) and a Kaleidoscope Screensaver (Win95 only).

To install the programs onto your desktop from the floppy disk, put the floppy into the drive.

Windows 95
 Click on START\RUN from the taskbar. Type into the box a:\FLOP0397.EXE then click OK.
Win3.11
 Go to FILE\RUN on PROGRAM MANAGER. Type into the box a:\FLOP0397.EXE then click OK.

To install the programs from the CD: From Windows Explorer or File Manager, double-click on FLOP0397.EXE in the

How to use the CD-ROM

- Quit existing applications.
- Put the disc into your CD-ROM drive.
- Win 95:** If you've got Windows 95, the PCW interactive loader will appear on your screen. If your CD doesn't auto-load, start Windows Explorer and double-click PCW.exe.
Win 3.1: From Windows Program Manager choose File/Run, then type in <CD Drive>:\PCW.exe and press enter.
- Click on main menu. If you don't have Quicktime for Windows, Video for Windows or Acrobat with search plug-in installed, you will be offered the chance to install them before continuing.

Hardware requirements
 To run the CD-ROM, you need a PC with Windows 3.1 or later and a colour VGA display. We recommend a multimedia 486 or Pentium PC with a minimum 8Mb of RAM. The optimum configuration is a 16Mb Pentium.

Possible CD-ROM problems

- If you have launched Acrobat reader in the Hands On section and cannot find the search icon that is described in the first page of notes, this may be because you already have a copy of Acrobat reader on your C: drive, so the autostart for this cover disc is not asking you to install our version which includes the search facilities. You can either delete your Acrobat reader from the C: drive, or change its name and run PCW.EXE again, which this time should ask you to install the Acrobat reader with search facilities.
- If you get a message such as "Not ready reading drive D:", you may have a dud CD. Return the disc to: TIB plc, TIB House, 11 Edward Street, Bradford DB4 7BH, for a free replacement.
 For other problems concerning the CD, call 0891 715929. Calls cost 39p/minute off-peak and 49p at all other times. (From 19th February all calls will cost 50p/minute.)

Possible problems with the floppy

- If you have problems with the floppy, such as the message "cannot read from drive a.", please return the disk to TIB plc, TIB House, 11 Edward Street, Bradford BD4 7BH, together with a SAE and two 25p stamps. Where it is a duplication fault, the postage will be returned with your replacement disk. TIB is on 01274 736990.
- Our floppy-disk hotline is available on weekdays from 10.30am - 4.30pm on 0891 715929.
- PCW cover disks are thoroughly virus checked, but PCW cannot accept liability for problems arising from use of the disk.

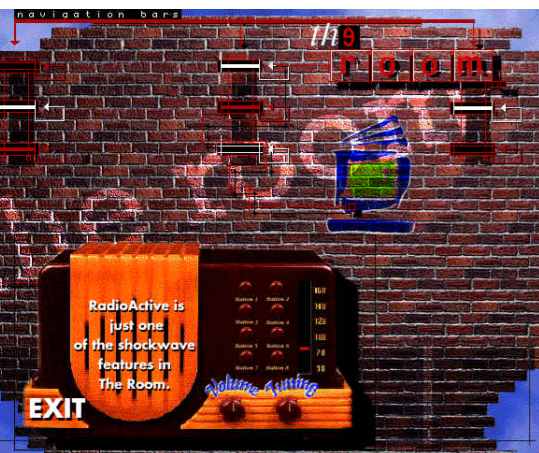
You are advised not to install any software on a networked PC without having checked it first.

Reference

PCW reviews index, advertisers' index, glossary and general information about the CD.

The Room

Browse through VNU's web e-zine. Play with the interactive radio.



Browse through VNU's new e-zine, even if you're not on the web

Software Library

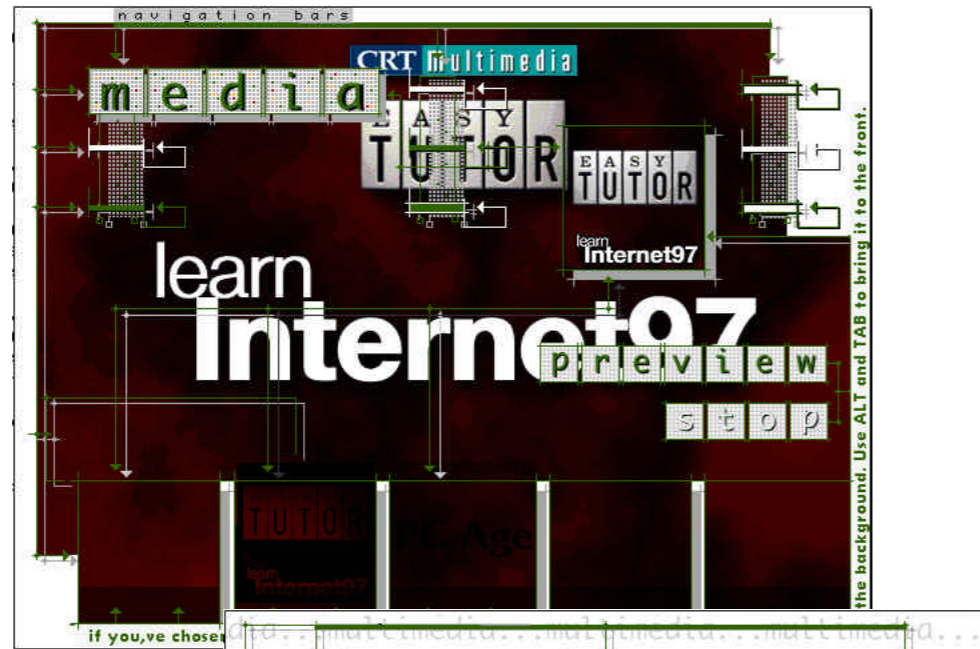
A library of shareware, utilities and drivers, each with a brief description which can be copied onto your hard disk, using the Netscape browser.

Correction

Pegasus Mail 16-bit is for Win3.1 and not Win95, as mentioned in the Software Library section.

Please Note

If you had problems installing the Novell Education Sampler in last month's Software Library, it may be because it has to be installed from a floppy disk. From that section, double-click the title and choose to copy certsp.exe to your hard disk drive. Next, double-click the self-extracting archive and copy its contents onto a floppy disk before double-clicking install.exe from the floppy.



Above EasyTutor
Learn Internet 97 helps build budding net-masters

Right XCAD 4: just the thing for finally drafting that design you've been carrying around for ages on the back of an old envelope

Below, right Get ready for Novell's CNE exams with this Network Training package

Multimedia & Featured Software

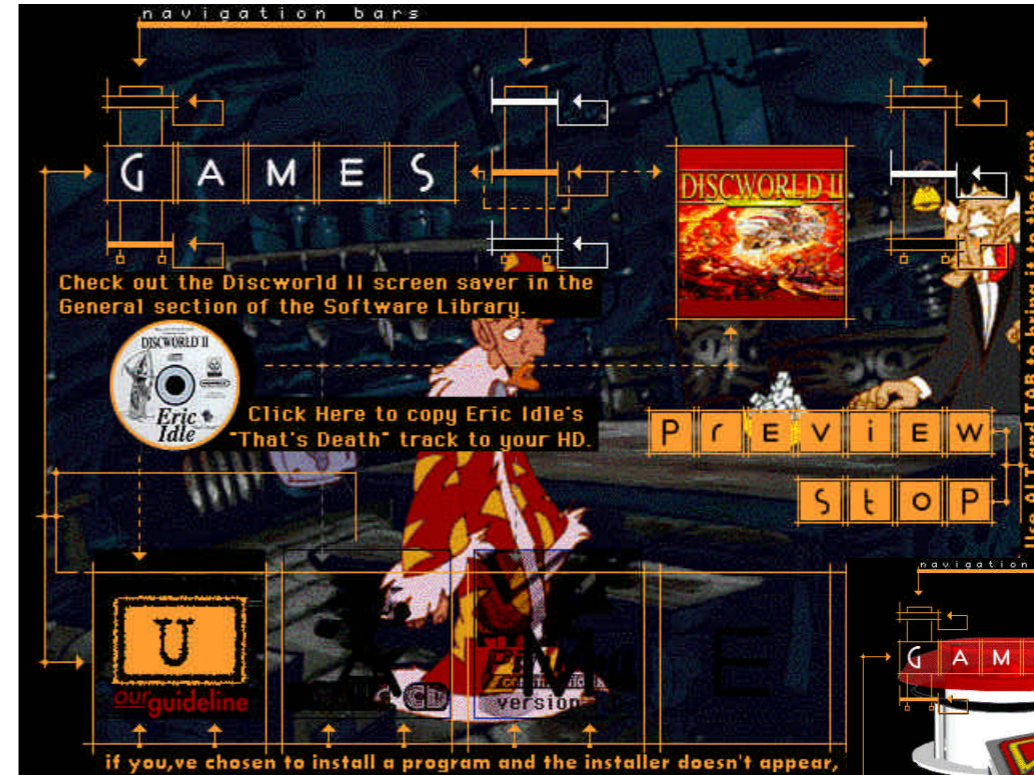
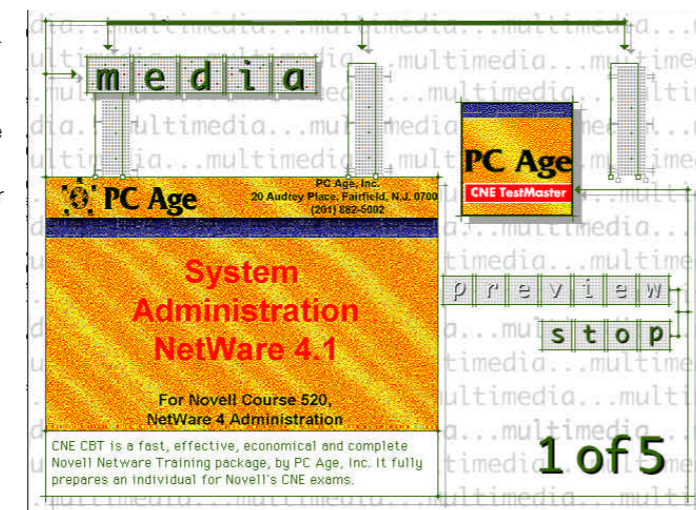
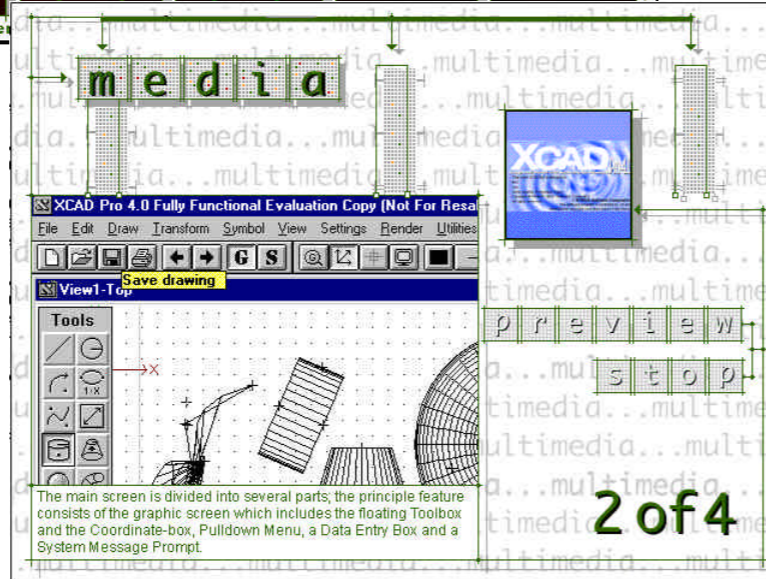
To preview any of the multimedia demonstrations, either drag one of the images along the bottom into the box in the top right corner, or double-click one of those images. The three demos on the disc are:

XCAD 4 — A CAD software application which combines advanced design, modelling and drafting features.

EasyTutor Learn Internet 97 (Win95) — A product which is aimed at helping Win95

users to master and maximise their use of the internet.

CNE Computer Based Training (CBT) — A fast, effective, economical and complete Novell Network Training package.



Games

To preview any of the games, either drag one of the images along the bottom into the box in the top right corner, or double-click one of those images.

Discworld II — (Sorry, Windows 3.1 users, this game is Windows 95 only)

Discworld II, by Psygnosis, brings the amazing world of Terry Pratchett to life as never before. Features of the full version include 25,000 cells of hand-drawn animation, humorous gameplay and full-screen viewing mode with fades, pans and close-ups.

Sonic the Hedgehog — (Sorry, Windows 3.1 users, this game is Windows 95 only)

Sonic CD, by Sega, is a fun platform game that will especially appeal to young children because of its ease of use. The aim of the game is to free your girlfriend, Amy, from the evil clutches of Dr Robotnik as well as picking up a few time stones along the way.

Pinball Construction kit v1.0 — Pinball Construction kit is the first

Windows-based pinball construction program. In the full version, which works equally well on Windows 3.11 and Windows 95, you can create your own pinball games using a library of thousands of pinball parts and graphics.

Left Discworld, Discworld... party on, dudes — with Terry Pratchett

Below You've never seen anything like it in any amusement hall: Pinball wizards can do it themselves and construct their own mean pinball tables with this first ever Windows-based construction kit

Bottom Hedgehog power rules! Using their old friend, Sonic, kids can ruin Robotnik and get the girl



Please note:

The demos featured in the Games and Multimedia sections can be previewed and some will run from the PCW main interface. However, due to technical issues concerning the software supplied to us, some demos will not run alongside the interface and others require installation to your hard disk.

Fast Track

If you would prefer to play or install the Games and Multimedia demos from outside the main PCW interface, or want to know the location of the Software Library home page (in order to use your own internet browser rather than the default Netscape browser), click on the HELP button on the PCW loader. This help/info file also contains the locations of other items on the disc, along with a full contents list and help tips.

Using the Hands On section

You can load Acrobat either by selecting Hands On from the launch menu or by going into the Hands On section of the main menu.



To search Acrobat files, just click on the search icon. A dialogue will appear. Merely type in the word you want to search for and click the icon.

In a second or so, the search results dialogue will appear containing a list of the files which contain that word.

You can then view any of the files. The word you search for ("CD-ROM drives", in our example) is highlighted. On average-sized monitors the text will be greeked, but you can use the magnifying glass icon to expand the text: just click on the icon then, with your mouse, select the area of the page you want to magnify.



Just type in the word you want to search for — in our case, CD-ROM drives



In a second or two, a list of all the files containing that word will appear

Please note:

Even if you have previously installed Acrobat Reader 3.0 from the Software section, when visiting our Hands On section for the first time you will be asked to install Acrobat. This is because in order to search across the PDF files, you need the search plug-in which is installed with Adobe Acrobat Search for CD-ROM, but not Acrobat Reader 3.0.

Using the Software Library section

The files in this section are copied to your hard disk using the default Netscape browser on the CD.

If you already have your own frames-compatible browser installed and want to access the resources section, run your browser, go to File Open and open D:\html\res\resource.htm

Compressed Zip files or self-extracting archives

Most files in this section are compressed Zip files or self-extracting archives. Click on the file that you would like to copy to your hard disk. A box will appear, stating the name of the file to copy and the destination directory. Click on OK.

If you are using the default browser, you will be given the option of:

1. Copying the file only, from the CD to a destination of your choice, with no further action.
2. Decompressing the files contained in the archive into the destination of your choice.

By selecting both of the above you can copy the file *and* decompress it into your chosen location.

If you have to abort the copy, and subsequent attempts to download the same file give an unexpected filename, go to c:\vnu\netscape and delete the copy of

the file contained therein. Next time you click on the hypertext link, the transfer should work okay.

Other file types

Click on the file that you would like to copy to your hard disk. This will bring up the "save as" dialog box. Choose where you want to copy the file (make sure you don't try to copy the file to the CD itself, or you will get an error message). It's a good idea to create a directory or folder for it first (using Windows File Manager or Explorer).

Note: Avoid copying any of the resources files into your Windows directory or into the root of your C: drive.

Using Netscape

The *Personal Computer World* Interactive CD-ROM uses Netscape as the delivery mechanism for the resources section and to run the Room e-zine.

If you're on the internet, chances are you're already using Netscape and have a rough idea of how it works. If you're not, this provides a great opportunity to find out what this browser business is all about.

You navigate through web (or HTML) pages using hyperlinks. These are images or, more often, highlighted text which takes you backwards and forwards

through different pages. You can also move between pages you've already visited by using the back and forward arrows on the toolbar.

Netscape 2.0 also has a feature called "frames" which divides the screen into separate areas. When using frames, use the right mouse button, rather than the arrow keys, to move backwards and forwards.

When using Netscape from within PCW Interactive you'll need to go to File/Exit to return to the main screen.

Installing PKUnzip or Winzip

Zip files are the standard compression format for distributing programs and utilities on the web and on floppy disk. If you choose to copy the resources zip files onto your hard disk and decompress them later, you will need to install PKUnzip or Winzip before you can "unzip" them. Go to the Essential Utilities section and click the link "PKZip/PKUnzip" or "Winzip".

Winzip: choose Winzip and a new page will appear offering you Winzip for Win95 and Winzip for Windows 3.11. Select the appropriate platform and save it to a location of your choice. If you have less than 16Mb of RAM it's probably a good idea to quit Navigator, and the PCW CD next. Then use File Manager or Explorer to find Winzip95.exe or wz60wn16.exe.

PKUnzip: choose PKUnzip and save pkz204g.exe to your hard disk — the C:\DOS\ folder is as good a place as any to save it. After you've quit Navigator and the PCW CD, double-click on the file to expand it to 16 separate files (if you have chosen not to decompress and save it to your hard disk in one action).

Associating the file: unless you intend to use DOS to unzip files (laborious and tricky) you need to associate .zip files with PKUnzip. From File Manager, choose File Associate to associate *.zip files with PKUNZIP.EXE. Under Windows 95, zip files will be associated automatically.

March 1997



PCW INTERACTIVE Entire Contents List:

Multimedia section

- CNE Computer Based Training (CBT)
- Easy Tutor Learn Internet 97 (Win95 only)
- XCAD 4

Games section

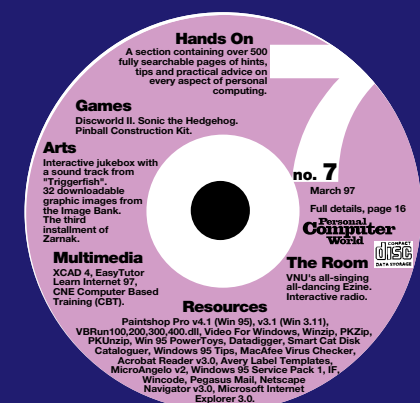
- Discworld II (Win95 only)
- Pinball Construction Kit
- Sonic the Hedgehog (Win95 only)

Arts section

- 32 graphic images from the Image Bank
- Jukebox containing the track *Lucky Star* from Triggerfish
- Zarnak (pt 3) — new interactive sci-fi comic

Getting Started

- A beginner's interactive exploration of notebooks, printers and desktop PCs



Personal Computer World

CD Index

- A searchable index of the PCW cover discs since Sept '96

Hands on

- Hints, tips and practical advice on every aspect of personal computing

The Room

- A browse through VNU's new e-zine

F O L D E R S		
Reference section • 12-month products and features archivable database • Advertisers' index • General info about the CD • Glossary of PC terms	• Discworld II Screensaver • Flash View • Geography • GPS Software • IF • Internet Explorer 3.0 (Win95/NT) • Kids' Icons • MapItAll • McAfee Virus Checker • MicroAngelo v2.1 • Microsoft 3D Movie Maker • Microsoft GIF Animator • Netscape Navigator v3.0 (Win 3.x/Win95/NT) • Noteworthy composer • Paint Shop Pro v4.1 (Win95) • Paint Shop Pro v3.1 (Win3.1) • Pegasus Mail for	16- and 32-bit • PKZIP & PKUnzip • Quake v1.01 • Rocket Quake Level • Rings of the Magi • Sifter • Smart Cat disk cataloguer • Vatman 95 • VBRUN 100, 200, 300, 400.dll • Video for Windows • VistaCalc Spreadsheet • <i>What PC?</i> — mobile pages buyers' guide for Psion 3a including the new Nicholson London Pages • Wincode • Win95 PowerToys • Win95 service pack 1 • Win95 Tips • Winzip
Software library section Including those files referred to in the <i>Hands On</i> section of PCW • Acrobat Reader v3.0 (Win95/Win 3.11) • Aircraft Quake Level • Avery Label templates • Cachchk • Chess • Cosmo Solar System Screensaver • Datadigger	• Microsoft 3D Movie Maker • Microsoft GIF Animator • Netscape Navigator v3.0 (Win 3.x/Win95/NT) • Noteworthy composer • Paint Shop Pro v4.1 (Win95) • Paint Shop Pro v3.1 (Win3.1) • Pegasus Mail for	

Wanted: material for PCW cover CD-ROMs

We are always on the lookout for material for our cover-mounted CD-ROMs. If you think you have something that might be suitable, such as software, pictures, fonts, demos and so on, please let us know: email Steven Rogers at stevenr@vnu.co.uk or write to him at CD Development, New Media, VNU Business Publications, 32-34 Broadwick Street, London W1A 2HG. *Please note that Steve cannot deal with technical support.*

Newsprint

Edited by Clive Akass. Send your news and views to: news@pcw.vnu.co.uk

MORE MMX NEWS

Prices to drop p29
Christmas rush p34
MMX explained p178
Group test p166

Bargain hunters on alert as Intel faces MMX fury

Upgrade, mobile versions coming

An overdrive chip that will upgrade Pentiums to MMX will be shipped later this year, Intel said. No details were available on prices for the upgrade, or on which



motherboards and chips are upgradable.

A low-power-drain MMX chip for notebooks is also in the pipeline. But Toshiba has already launched an MMX model, the 730XCDYT (pictured above).

Toshiba 01932 828828

Other news

Psion gets Windows 27
Navigator 4 32
First 56K modems 32
Novell denies drift 35
RAM ramp-up 36
D-I-Y boom 41
Smart appliances 44

Intel's new, multimedia-enhanced, MMX chips were launched to a resentful world last month, rendering obsolete at a stroke machines that people had bought only days before for Christmas.

Cannier buyers, who knew the 166MHz and 200MHz MMX Pentium chips were coming, were waiting for old Pentium prices to drop (see p29) in the hope of picking up bargains.

TV and press reports claimed that Intel delayed the launch to let dealers and PC makers clear stocks for Christmas. But manufacturers said they would have made MMX PCs if they had had the chips, and Intel protested that it had waited for software to become available.

The bad timing seemed to be as much cock-up as conspiracy. One vendor said: "Intel clearly does not understand the retail market, launching right in the middle of a major sales period." Intel describes MMX as its

biggest architectural change since the 386 chip which ushered in the Windows age. But the launch turned out to be its worst public-relations disaster since the Pentium bug furore almost exactly two years before.

MMX gives the Pentium basic signal processing facilities found on video and soundcards. It extends the Pentium instruction set by 57, so software must be specially written. But PCW tests confirm Intel's claim that MMX runs standard applications around 20 percent faster.

Oddly, Intel further spoiled the launch with a ludicrous demonstration of this real advance by comparing MMX audio with that of a "standard" soundcard which sounded like cheap pocket radio wrapped in a wet blanket. And this to a room full of technology



Maris' £39.95 Space Station Simulator is one of a handful of MMX-ready packages available. It is based on modules that will be used to build a real international space station over the next five years. A web site will follow its progress so you can keep your model up to date. You can design your own, too. Maris 0171 488 1566

journalists who knew well what a good soundcard can do.

Non-MMX Pentium machines are still expected to sell through 1997. But just about every vendor is offering MMX PCs.

Meanwhile, to ease the sleep of those of you fretting over commercial effects of the MMX furore, Intel announced 1996 profits of \$5.2bn on revenues of \$20.8bn. Clive Akass

Multimedia add-ons will have to get better

MMX performs many of the functions of sound, video and even modem cards and will supersede cheaper ones. But there will remain a need for high-spec add-ons.

Card makers welcomed MMX, albeit through gritted teeth, saying it will allow them to make cheaper boards by offloading some processing. Sim Wong Hoo, chairman of SoundBlaster developer Creative Labs, claimed MMX could not

cope with the data load of sophisticated multimedia tasks, "...but when combined with our technology it can result in a far richer ... multimedia experience."

Chris Bakolas, technical director of Dan Technology, said MMX helps PC makers by offering reliable, tightly-coupled, multimedia processing with none of the configuration hassles of add-ons. But he, too, says add-on cards will still be needed.

"MMX provides a new baseline performance that card makers have to beat."

MMX also simplifies the work of software writers. Nick Maris, who publishes Space Station Simulator (see picture, above): "It can be a nightmare having to take into account the idiosyncracies of different video boards. MMX provides a single standard API [application programming interface] to which we can write."

Jobs for the toys as Apple looks for its old gee-whizz

Cold reality hit Mac lovers last month after euphoria over the news that Steve Jobs is returning to Apple.

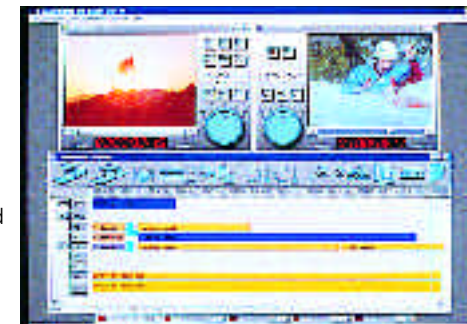
Apple's \$400m purchase of Jobs' NeXT Software, late last year, took all by surprise. NeXT's NeXTStep will underpin the new MacOS, code-named Rhapsody (see box).

Apple had been widely expected to adopt the rival BeOS after its Copland OS project ran into the doldrums.

Jobs is the Great American Dream incarnate: an adopted orphan who started a business in a garage and ended up a billionaire. He and his pal Steve

Wozniac were Apple's original gee-whizz kids, selling computers they built themselves. Jobs gave the Mac the Xerox-born graphical interface and mouse long before Windows took off.

Neither Steve survived Apple's transition from hippy startup to corporate. Jobs was ousted by John Sculley, a former Pepsi executive he himself recruited. Wozniac joined Jobs and Apple CEO Gil Amelio on stage at January's MacWorld as if to signal a return to the days of



D-Vision's Online shows NT invading Mac territory

the boys' toys. But how much Jobs will be involved is unclear. His \$1bn company, Pixar, made the Disney hit Toy Story.

And Apple announced a disastrous \$1bn loss last year. Much of its top talent has left and developers are drifting to Windows. So are the image-intensive applications it once monopolised. D-Vision's high-end Online 2.0 video editor (above) for instance, uses NT.

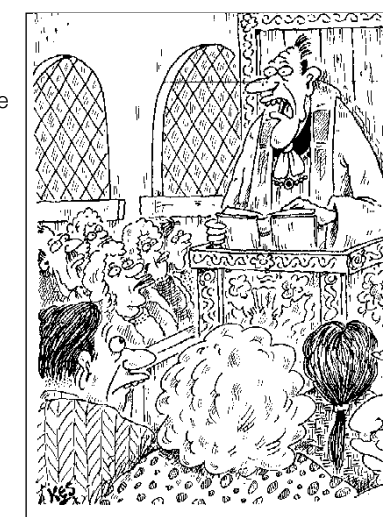
Wall Street's verdict was an 18 percent fall in Apple shares.

Computers sing praises

Church of Scotland ministers in Lochaber are assessing a computerised digital hymnal because trained pianists are becoming hard to find. The hymnary provides soundtracks to 3,000 hymns and could be shared between parishes.

Web site pays visitors

A web site at www.cybergold.com is paying people to look at it. The idea is that paying people to view an advertisement can work out cheaper for advertisers than direct mail shots and other, traditional, forms of selling. Users have to fill in their details and interests to facilitate the targeting of advertisements. Typical payments are between \$1 or \$2 per advertisement to signed-up users.



"Finally, let us pray that the computer does not crash for our next hymn, 'Oh God our help in ages past'."

Short Stories

Psion looks in on Windows

Psion, facing new competition from palmtops using the Microsoft CE interface, has bought into Windows for its next generation EPOC32 operating system.

It has licensed Citrix's ICA protocol, which will allow Psions to control and mirror an application running on an NT server.

Simon East, software product manager, said the move was a response to demand from corporate customers rather than to counter the CE threat. "Many people want to access data on corporate systems."

But he believed the same technology could provide a window onto Win95 PCs.

Psion 0171 208 1800

Six-CD jukebox

Teac's CD-C68E eight-speed jukebox holds six CDs, fits into a half-height bay, and costs just £179. Watch out for a review in PCW.

Tekdata 01782 577677

Cheaper Pilots

US Robotics has slashed prices of its Pilot palmtops from £299 to £229 for the 5000, and from £249 to £189 for the 1000, all VAT inclusive (see our group test on p192).

It seems that Microsoft's catchphrase will be "Don't blame us" with the release this year of the next version of Win95, codenamed Memphis. The old message box which appears after a crash will be replaced by one that names the app at fault. The reason, we hear, is that Microsoft is tired of "taking the hit" for third-party errors.

DVD and net boxes steal consumer show

All major DVD companies showed devices at the winter Consumer Electronics Show. Most showed video players but Sony and Toshiba also had DVD-ROM drives, expected eventually to replace CD drives.

Sony plans to launch PCs with DVD-ROM drives this year. Philips stated it will launch a DVD-ROM.

Also big were appliances for net surfing without a PC. Philips, Cidco and Navitel were showing internet phones complete with modem, browser, keyboard and large screen.

Navitel's TouchPhone uses Microsoft's Windows CE and Pocket Internet

From George Cole in Las Vegas

Explorer. The phones are around \$500 (£333) each.

Philips and Sony had WebTV set-top boxes. Later this year, WebTV will introduce a technology called VideoFlash, which enables full-motion, MPEG-1 video to be downloaded from the internet in real time.

Akai and Zenith had Network Computers, and Sharp and Mitsubishi showed TVs with built-in modems and browsers.

DirecTV plans to send web pages, multimedia magazines, software, games, news and sport to

PCs by satellite. Microsoft has licensed the technology for Windows 95, and IBM. Gateway 2000 and other manufacturers are developing PCs for the system.

Emc³ announced plans for high-speed data delivery for games, video and software. It allows a full-length movie to be downloaded in about five minutes.

Sharp's MD-PS1 digital camera records up to 2,000 images on an MD Data disc, or 365 images with 40 minutes of stereo sound.

Also out in force were handheld PCs from Philips, Casio, LG Electronics and Hewlett-Packard. It was one hell of a show.

Tim Bjarin reports from the US



■ Compaq, like many PC vendors, needed to keep revenues flowing as buyers waited for machines using Intel's new MMX chip to appear. So to boost sales, it has been offering some amazing deals.

You could get a rebuilt 120MHz Compaq Presario with a 1.2Gb hard drive, 8Mb RAM, 3D sound, quad-speed CD-ROM and 28.8 modem for \$799, without a monitor.

A refurbished 133MHz Presario with a 1.6Gb drive, 16Mb of DRAM, a rewritable PC-CD drive, a 28.8 modem, 3D soundcard and MPEG 1 video processing cost just \$999.

The stock sold out within three days of being advertised, my sources tell me. Watch out for other manufacturers unloading stock during 1997.

■ Many analysts have been predicting that we will get full-blown Pentium PCs, with monitor, for less than \$999. In fact, that was one of my predictions for 1996. Some smaller vendors achieved that price point for Christmas, but it wasn't until 3rd January that a major player did.

Packard Bell announced a 120MHz Pentium system with a 14in colour monitor, 1.2Gb hard drive, 16Mb of RAM, an eight-speed CD-ROM and a 33.6Kbps modem for \$999. It blames high prices for the fact that two in three US homes lacks a PC, and has taken it upon itself to change all that.

What makes this move so interesting is that it invades the network computer (NC) space that Larry Ellison, of Oracle, has been pushing. The NC is based on a stripped-down box with little memory and no hard drive. All the information resides on an intranet or internet and the NC itself is basically a terminal.

Ellison maintains that the general user does not need to deal with bugs, crashes, or system updates. But PC users don't want to lose their hard disks and personal space.

Ellison could argue that the NC is still cheaper and less hassle, but PCs are reaching a price point that allows them to take on the NC head-to-head.

Wait for it . . . Pentium prices will drop as MMX takes hold

■ MMX-equipped PCs, although initially priced higher than standard Pentiums, will not be playthings for the rich for more than a few months. As MMX prices fall, vendors will offer bargains on conventional Pentium PCs.

Some are already pricing aggressively. Gateway said it will sell its MMX PCs for the same price as its old Pentiums. Larry Smith, head of IBM's consumer division, said: "Soon you will see our 166MHz and 200MHz MMX systems at prices lower than a conventional P166 or P200 was in December."

The first wave of IBM Aptivas to incorporate MMX will ship next month, hard on the heels of a refreshment of conventional systems this month. When that new range appears, a P166 Aptiva will be "several hundred pounds lower than it was in December," said Smith.

"MMX will mean adding some £100 - £200 to a system price," said Steve Crawley, AST product marketing manager. "But there will



be other components added to take advantage of MMX technology, to account for this price increase. As non-MMX chip prices come down, it will mean about a \$150 price drop for non-MMX entry-level systems."

A 166MHz MMX chip will cost about \$400 to large manufacturers; currently the price of a conventional non-MMX P166. But according to one PC maker, a conventional P166 chip will drop \$100 in February and further in May. MMX chip prices will also drop, but not as much, and by May there will be a \$90 differential between MMX and conventional chips.

Short Stories

Grey Cell GSM card claims wide coverage

■ Grey Cell says its new 4000 GSM faxmodem is the only Nokia-compatible to work with every land-based European network as well as with GSM and PCN 1800 networks like Vodafone, Cellnet Orange and One-to-One. The 4000 costs £349 fully configured, or £199 for a standard faxmodem with the option to upgrade for £150. A GSM-only 6000 model costs £249.

Grey Cell 0181 938 1000

New notebooks from Brother and Twinhead

■ Brother and Twinhead have both brought out new notebooks. The £1,599 (plus VAT) Brother Expression has a 10.4in TFT display and an 810Mb removable drive.

The Twinhead Slimnote 9 (£1,845 plus VAT) has a 12.1in TFT display, 2Mb of video memory and zoomed video.

Brother 01279 416888

Twinhead 01256 56066

Crash course

■ Xyratex, the storage specialist formerly owned by IBM, has launched a no-fix/no-fee service which it claims "virtually guarantees" the recovery of data from crashed hard disks.

Xyratex 01705 486363

Email use soars

■ Email use will rise from two percent in 1992 to 50 percent by 2001 in the US, according to a new Forrester report.

MYOB 6.0 ships

■ Best Software has launched version 6 of the MYOB accounts package for Macs and PCs.

Best 01752 201901

New low-cost servers oust old workhorses

PC vendors are scrambling to meet a soaring demand for low-cost servers among small companies, many of which have been relying on old, low-spec, PCs.

Many are changing their hardware when they move to Windows NT and NetWare 4.0. Intranet and the internet applications are more demanding of servers than traditional

file and print operations, as are easy-to-use shrink-wrapped database applications which are increasingly popular.

Hewlett-Packard, Dell, Compaq and Apricot have all announced models to meet the growing market.

"A lot of people previously made do with an old PC that they set up as a server. When they come to upgrade they realise that they get better value by buying a robust server with all the storage and security options they need," said Hans Sparkes, product marketing manager for Mitsubishi Apricot.

Apricot claims its FT1200 server is cheaper than any rival, without compromising on features. It costs £1,999 with a 200MHz Pentium Pro chip, 32Mb of RAM, ultra SCSI, a 2Gb disk and ethernet. It claims this is £100 less than Compaq's ProSignia 200, with a similar configuration but using a 166MHz Pentium, and £300 less than a ProLiant 800 with a 180MHz Pro.

Apricot 0121 717 7171

Dell 01344 720000

Compaq 0181 332 3000

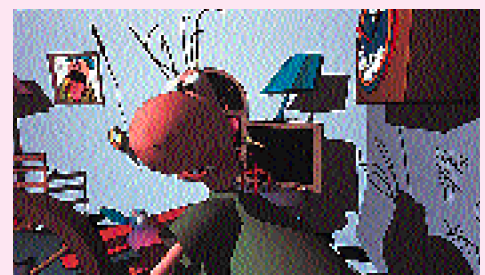
HP 01344 360000



Apricot's new server includes a lockable cover, complete with software alarm, to guard access to disk drives. It also covers the on-off switch. So what is that big switch at the top? "Er... that's just for show," said product manager Hans Sparkes. "But some users might find a use for it."

Graphic display

■ This image by Canada's Richard Condie will be on show at the Imagina imaging exhibition which is part of the Television Festival of Monte Carlo on 19th-21st February. Details from the Institut National de L'Audiovisuel on (33) 01 49 83 26 71.



Macros "the major virus threat of the future"

■ Macro viruses will become the major virus threat of the future, predicts a new report. Concept, the first to take hold, is the world's most common virus, accounting for 15 percent of infections. It was first distributed on a Microsoft technical CD in 1995.

Macros are automated routines which you can write yourself for applications such as Word and Excel. They can do anything

you can do at the keyboard. Concept is launched simply by opening a document and infects any further Word files you create. Although it is, in itself, harmless, it can easily be adapted to do damage.

It will run on any platform, including the Mac, that runs Word. But the many language versions of Word make it "difficult but not impossible to write an international

Word macro virus," states the report from virus specialist, Sophos. The most promising solutions check files for viruses during open and close operations.

Microsoft says risk is something you have to accept if you want the power of macros, and that the best defence is to accept documents only from trusted sources.

Sophos 01235 559933

Netscape's new Navigator 4.0 makes absolute sense of HTML

Netscape marked the New Year by announcing a range of products designed to compete against Lotus and Microsoft in the growing intranet market.

Communicator is a suite of HTTP-based tools for inter-company communications, including a new-look Navigator, new email client, conferencing software and simple web creation tools.

As ever, Netscape has extended HTML with Navigator 4.0, with tags to support the layering of graphics, server-based web fonts and "absolute positioning". This allows web designers to place objects precisely on a web page by applying x and y co-ordinates to blocks of HTML.

All new extensions have been submitted to the W3C but Netscape is unlikely to await ratification from the increasingly redundant web standards committee as Netscape battles with Microsoft for web supremacy.

The new interface (looking remarkably like Internet Explorer 3.0) comes with custom toolbars and a revised set of "softer" icons. The new Messenger mail client brings HTML-based email and includes a search



facility that links directly to four web-based email directories (including Big Foot and 411) without opening a browser. Microsoft recently upgraded its own mail client with a similar facility. However, all the new features have increased the size of the suite to nearly 15Mb, raising fears of the software bloat that has blighted office suites.

The Standard Edition will cost \$49, with a Professional Edition at \$79 including extra networking tools. Both should be available by 31st March.

PJ Fisher

Netscape 0181 564 5125; www.netscape.com

Netscape's new browser looks in on its rival

Short Stories

Offer on paper

PaperDirect is offering paper kits for £8 (plus VAT); a discount of £2, if you quote reference MKPR6. They contain 50 paper designs in 17 formats including brochure and business cards.

PaperDirect 0800 616244

MacPC modem card

Motorola has launched what it claims is the first PCMCIA fax-modem, compatible with both Mac and PC laptops. It costs £159 (incl. VAT).

Motorola 01293 404343



Sony's new £45 DR50PC-AMP headphone and mic set has been designed for extended use with PCs.

Sony 01932 816000

2001 — a PC odyssey

One in two US homes will have a PC by 2001, forecasts a new Forrester survey. PC sales will have grown to 17 million, from about ten million in 1996.

Lines still crossed over new 56K modems



Brain Boxes (0151 220 2500) is one company offering an upgraded serial port (see story, right). Its £125 **Velocity RS232** board uses the new 16750 UART and can pass nearly 1Mbit/sec

During the coming months, confusion is likely to reign over the next-generation 56K modems, which download at nearly twice the speed of current top models.

There are two rival designs:

- The US Robotics x2 technology, which has been adopted by all major UK service providers except Demon.
- Rivals Rockwell, Motorola and AT&T spin-off, Lucent, have made an unprecedented agreement to make a compatible 56K chipset. They have also been backed by Hayes.

The ITU standards body is due to discuss the issue next month but is unlikely to arrive at a conclusion for months yet.

US Robotics (USR) scores in offering easy upgrades. Existing USR Courier models and later Sportsters need only a software fix, for which a \$95 charge has been quoted. The first devices and upgrades are due to ship now.

USR provides only a 56K download path; data from the user to the server runs at only 33.6K. Rockwell, which makes the chips for most of the world's modems, claims to have achieved a 40K upload.

The first non-USR 56K modems, due by the end of April, will not be software upgradable to any eventual standard, but later ones should be, says Grey Cell's Nick Hunn.

And there's further confusion over a possible need to upgrade the PC serial port. This usually uses the 16550 UART chip, itself once an upgrade to cope with faster modems. It is rated at 115Kbps but 56Kbps modems can overload it because they compress and decompress data on the fly.

Bill Pechey, chief engineering officer at Hayes UK, says this will happen if the data traffic is highly compressible, like text.

"In normal internet use the data is mostly compressed before being sent, so compression by the modem is minimal. Also, it is dependent on the speed at which the service provider puts out data."

DK bucks a losing CD-ROM trend

Most CD-ROM publishers have lost "vast amounts of money", according to a new report. It states that costs are high and "few publishers have realised suitable returns."

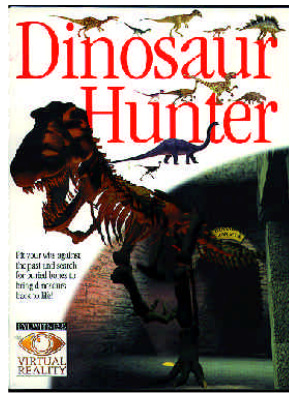
One major exception is Britain's Dorling Kindersley which specialises in children's titles (see

picture). And reference CDs have sold so well that the company has decimated the market for its printed equivalents, says the Euromonitor report, *Publishing at the Crossroads*.

It points out that CD-ROMs could boost the sales of some books, in the same way as films.

But CDs will hit titles and formats that "...cannot compete with electronic methods of augmenting learning and imagination."

The report says the internet can be used to distribute serialised content and predicts increased use for updating CDs. **Euromonitor 0171 251 1105**



Short Stories

Caddie 5.0 drives up the features

A major upgrade has been launched of what is claimed to be the second best-selling CAD package among UK architects.

New features in Caddie 5.0 for Windows include layer management, colour fill, multiple document display, TrueType support, and document links. It costs £695 (plus VAT) or £200 to upgraders. Version 4.2 will still be sold for £495 (plus VAT). **Caddie 01727 830551**

Web starter pack

Inter.connect is offering a £130 (incl. VAT) start-up pack designed to take the mystique out of getting onto the internet. It includes a 28.8K Pace modem and trial subscriptions to three online services.

Inter.connect 07000 878787

Fast work

The £50 Touchstone FastMove 2 package claims to be able to provide simple file transfers and synchronisation between PCs, laptops, networks and Zip drives.

Touchstone 0181 875 4456

2.3Terabyte storage

Sony's new WDA-500 optical jukebox can be configured to store up to 2.3 terabytes (a thousand gigabytes) with an extension unit. Sister units optimised for speed can offer an average access time of 150ms and a sustained transfer rate of 2.7Mb/sec. **Sony 01932 816000**



Post-It firm sues Microsoft



The 3M conglomerate, best known to PC users for its storage media, is suing Microsoft for allegedly infringing its trademark for Post-It notes.

3M claims that sales of Post-It notes in electronic and paper formats amount to hundreds of millions of pounds a year, worldwide.

Office 97 does use the words "Post it" in a wizard (left), guiding users through a method of annotating documents.

It is unclear whether this is the sole basis for 3M's claim. Annotated words are highlighted in yellow (the Post-It colour) but no notes appear.

3M is demanding damages and legal costs.

New Year spree as PC buyers hang on for sales bargains

Monday 23rd December saw the highest recorded footfall in computer shops, but retailers are more pleased with the results of their January sales than with the pre-Christmas season.

PC vendors had expected a bumper Christmas and they "...were pleased but not ecstatic," said Mike Evans, consultant at Retail Profiling. "High-ticket electrical goods tend to hold their prices before Christmas and most people wait until after this, for the sales. So January sales have been more successful than the pre-Christmas run-up, but it lasted for two weeks of January only."

Prices dropped significantly in the January sales. PC World cut Packard Bell's P120 machine to £1,149, Acer's P100 Acros to £899, with deep cuts on software from brand leaders such as Electronic Arts, Dorling Kindersley and Disney.

Byte's sale cut a Compaq Presario P120 to £1,099 and bundled its own Patriot P100

with an HP 400C printer for the same price.

"Right across the retail market it was quieter than expected, which means some manufacturers caught a cold with excess inventory," said Larry Smith, IBM consumer division manager. "Look at who took the most price action in January to see who caught the biggest cold."

Independent retailers reported strong pre-Christmas sales. Martin Briggs, of Wales-based MCB, described them as "Storming! Our best Christmas ever."

"The November-December period was strong on multimedia but slower in the Christmas week itself, except for smaller-ticket items like software," said Neil Cox, marketing manager of Byte. "The January sales began slowly ... but picked up."

Sales of PCs, peripherals, software and Sony Playstations were significant in "highly satisfactory Christmas trading," according to DSG chairman, Sir Stanley Kalms. Pre-Christmas trade was up by 20 percent.

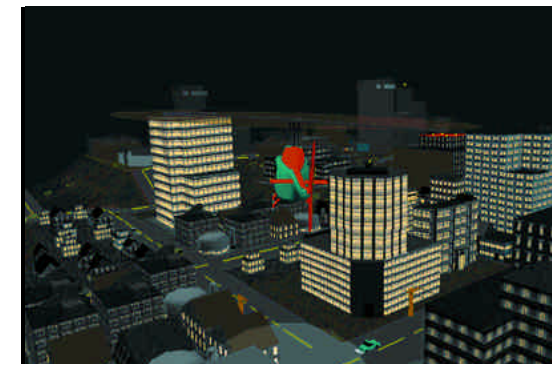
Gay coder sacked over poolside 'Easter Egg'

A new helicopter-rescue game turned into one of "hunt the swimming trunks" after a programmer was sacked for including an illicit sequence of boys frolicking by a swimming pool.

Publisher, Maxis, discovered the sequence in SimCopter only after 50,000 copies had been released in the US, so the news set an extra challenge for thousands of players who got the game for Christmas.

But there was disappointment in store for those who had heard a rumour that the clip included scantily-dressed women. The clip showed only boys and had been added by a gay programmer to balance the game's liberal use of pretty girl "Sims", according to US reports. There was little that was overtly homosexual about the added content, which has been edited out of UK versions.

Only experts could find the clip, which appears in place of one showing a celebratory brass band when players have completed level ten of the game.



SimCopter is a companion game to the classic SimCity 2000 but can be played independently. Maxis points out that the series is not suitable for young children, and is played mainly by teenagers and adults.

Game coders are fond of inserting unexpected fun sequences, called "Easter Eggs". Maxis made a statement that it "has a specific policy against programmers including unauthorised material."

● See the review in *Screenplay*, page 537

SimCopter on a night-time rescue mission

BT offers PC call system

British Telecom has jumped onto the telephony software bandwagon with a £150 (incl. VAT) package named Callscape 100, which logs all calls and automatically displays details of customers as they call, identifying them from their phone numbers. A box logs calls even when the PC is switched off. Details on 0800 800800.



Battle of statistics as Novell denies drift to NT

Corporate UK is turning its back on Novell NetWare and Unix, in favour of Windows NT, according to two new surveys. But Novell cites alternative figures from Spikes Cavell which show that 69 percent of those questioned chose NetWare as their network operating system while 15 percent chose NT.

Nearly half of UK IT managers with plans to purchase operating systems, surveyed by Computer Intelligence, chose NT while 29 percent plan to install or upgrade NetWare. Unix trailed in third place with a 12 percent commitment.

"NetWare still dominates in terms of overall UK market share of 72 percent," said Mike Daly, managing director of Computer Intelligence. "But it is the rate of change which is worrying for Novell."

NetWare is holding ground among existing users who intend to upgrade, but in new installations NT is eating Novell's lunch, indicates research from analysts, IFF.

Of the 1,567 organisations polled by IFF for Black Box, 36 percent will change their network operating system during the next year. NetWare 4.x is the preferred route for existing NetWare users but NT is expanding

its user base for new installations, taking market share from Unix, Lan Manager, AppleTalk and SNA.

"The Spikes Cavell figures show that Novell with Intranetware is the dominant strategic decision for 1997," said Jacqui Forrest, Novell sales and marketing development manager.

● Oracle will launch a server operating system, NC Server, later this year which will compete with Windows NT but be simpler to install and maintain, according to Mark Jarvis, Oracle's VP of server marketing.

Andrew Charlesworth

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Short Stories

Irresistible rise of the intranet

■ Companies will get intranets (local networks using internet protocols) whether they want them or not, according to a new Ovum report called *Intranets for Business Applications*.

Intranet technology will come as part of the operating system and will be incorporated into applications. "The question is not *whether* to implement intranets, but *how*," said lead author, Ashim Pal.

Ovum 0171 255 2670

Dense population

■ A company called GeoLytics has compressed the 1990 US Census onto a single CD, complete with a search engine. The official version, costing \$3,000, is on 67 CDs, although other publishers have compressed it to five discs costing about \$500. CensusCD from GeoLytics costs \$200.

GeoLytics 001-800-577-6717 (US); www.censuscd.com; e-mail info@censuscd.com

Novel move

■ An interactive novel by award-winning science-fiction author, Geoff Ryman, was launched last month at www.ryman-novel.com

Notebook superfloppy

■ OR Technology has launched a notebook version of its superfloppy drive which reads £13.50 120Mb disks and standard 1.44Mb floppies. It will sell to manufacturers for less than £100.

OR 01491 413663

**Epson launches 24-bit colour camera**

■ Epson has launched a 24-bit colour camera, targeted at PC users, for £449. The PhotoPC 500 offers a choice of 640 x 480 and 320 x 240 resolutions, respectively 30 and 60 of which can be held in the bundled flash memory.

Epson 01442 61144

RAM-chip ramp-up cuts memory costs

Ramming down the costs: RAM cards using cheap 2Mb chips

The price of 8Mb memory chips could plummet later this year as the big five Japanese manufacturers ramp up production tenfold. At the same time, production of 2Mb chips will be slashed.

The larger-capacity DRAM chips now

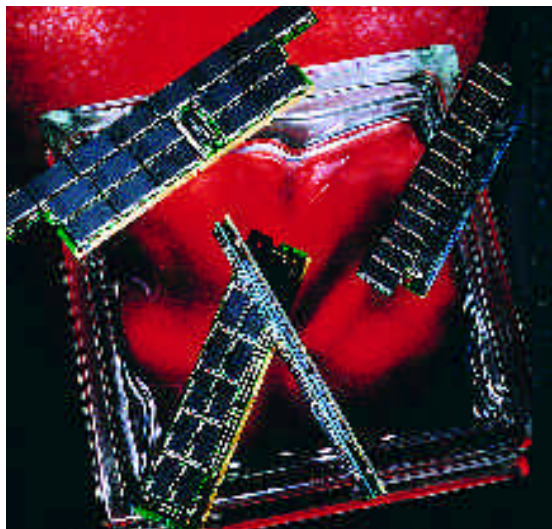
cost ten times more than the 2Mb ones: the prices are expected to drop to about four times as much, making the cost per megabyte much the same.

Toshiba, Hitachi, Fujitsu, Mitsubishi and NEC will ramp up 8Mb (often called 64Mbit) production from 700,000 to 7.5 million this year, according to Japanese reports. These firms supply 40 percent of the market.

Memory specialist Smart Modular Technologies is offering 64Mb and 128Mb modules using stacks of 2Mb chips back-to-back. This, it says, works out at a third of the silicon price of the equivalent, using 8Mb chips. They cost \$7-\$8 per megabyte in quantities of 100. The modules include buffers and come with 72, 128 or 200 pins.

SMT's John Walsh claims there are no timing problems in stacking the low-capacity chips, and there is no performance hit. "In fact, performance improves because of the extra memory," he said.

SMT 01908 234030



'International software ring' is busted after swoop on dealers

■ Microsoft claims to have busted an international ring of software counterfeiters involving companies in the US, Canada, the Bahamas and Britain after investigating two UK-based dealers. The case could have profound implications for the future of "grey imports"; products brought in from countries where they are sold more cheaply. Cut-price grey imports to Europe from the US are tolerated but not condoned by the trade.

The counterfeit operation is said to have obtained versions of MS Office and Office Pro which had been discounted for US educational use, and imported them to Britain where they were sold as full retail copies. Microsoft's software theft team investigated complaints from dealers about copies of Office bought from Surrey-based Q&M Technology and uncovered a haul of rebadged US educational versions worth

about £20,000. The company co-operated with Microsoft, and the investigation led to its supplier, Multimicro Distribution in Essex.

During the investigation, Heathrow Customs & Excise intercepted three consignments, intended for Multimicro, worth a total of \$130,000. Multimicro was supplied by Softek International of Canada and Softek Bahamas. It got the product from an authorised academic reseller which had reneged on Microsoft's sales restrictions.

Canadian authorities are investigating Softek. A UK court will decide whether Multimicro Distribution was acting illegally in importing the US versions. If so, this could have an impact on grey importing. Sharon Baylay, Microsoft's software theft team marketing manager, said the case was "significant because of its international nature."

Andrew Charlesworth

Short Stories



■ National Instruments is offering a free version of DAQ Designer, which helps you define a data acquisition need and then recommends a solution. It is available at www.natinst.com/uk/

Shorter OED

■ The New Shorter Oxford English Dictionary on CD-ROM offers 500,000 definitions, quotations, etymologies, an anagram solver and rhyming index for £79.99. OUP 01865 556767

AA guide

■ The AA Quick Reference Atlas CD-ROM provides the geographical and political maps of a paper-based atlas as well as information on economy, climate and population. AA 01634 297123

New power-saving spec could transform use of the home PC

A dull-sounding specification for power management could transform use of the PC. The open Advanced Configuration and Power Interface (ACPI) 1.0 spec was agreed by Intel, Microsoft and Toshiba last month.

One advantage is that it will bring to desktop PCs the kind of "instant on" facilities enjoyed by notebook users; no more tedious boot-up routines. But a set of low-power sleep states will make the PC far more practicable for tasks like voicemail and fax, or for controlling household devices.

Most current PCs require you to leave the entire system box (although not the display) running in order to monitor a phone

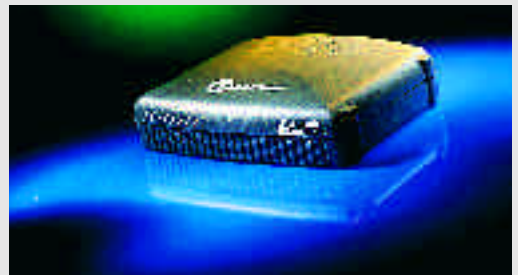
line for calls, or to switch on an oven.

ACPI 1.0 lets PCs turn on and off peripherals like CD-ROMs, network cards, hard disks and printers, as well as exterior devices. Conversely, peripherals can "wake up" the PC. More than 70 companies have participated in developing ACPI, which is operating-system independent.

Stephen Nachtsheim, vice president of Intel's mobile products group, said: "Intel will enable the hardware piece of this major advance in PC power management in our next version of desktop and mobile chip sets." The full spec can be downloaded from www.teleport.com/~acpi

Pace sets the ISDN pace

The latest £299 Ultralink ISDN terminal adaptor from Pace (0800 413078) uses an enhanced serial interface and compression to get a transfer rate of up to 230.4Kbps. It includes two analogue ports.



Acorn sees the future — and it looks small

■ Acorn and its offspring, RISC chip specialist ARM, may have low visibility when it comes to the name on the outside of products. But technology from the two Cambridge firms will drive many of tomorrow's small, low-cost, high-performance smart appliances.

Just where the markets are going is anyone's guess, but ARM and Acorn engineers believe they have all angles covered. In January, the Acorn team flew *en masse* to Las Vegas for the Consumer Electronics Show where they were talking to Cirrus Logic and other partners about dedicated applications. I caught up with ARM's Mike Muller, one of the eleven original engineers who worked for Acorn — he was busy on the ARM processor back in 1983. "There are at least two different sides to the discussion about where markets are going — appliances and services," he said,

FEN WATCH Caroline Swift continues her reports from Silicon Fen

pointing out that the internet has yet to develop into a consumer service. When it does, it will have a wide spectrum of users.

"Some will be surfing the net from a PC to locate services in which they are interested. At the other extreme will be people using TV-centric appliances in which information is packaged and presented like Teletext. TV will be a combo of internet and TV. You will use TV to surf the net and to provide some specific services. When you switch on, it will provide information that may have been gathered and edited for personalised or general use.

"At the moment, the net is free but the quality is variable. It is moving towards publishers who will provide services that are edited and managed. We see the market

taking off but it won't be one or the other, the PC or the TV. They are both going to win."

At Acorn RISC Technologies (ART) business development manager Tom Cave sees dedicated devices becoming increasingly popular. A recent caller at its door has been Curtis-Mathes (CM), the US maker of a top-end range of TVs, with a plan to make TV far more interactive.

CM's idea, the Uniview, would provide a range of services available on a TV set for which it would provide the server. It will enable a user, for instance, to order a pizza and provide secure credit facilities on its own server, rather than the net. Within three weeks ART had a working model ready.

"It is not just an internet device. It will be adding such things as interactive voice so you can phone your TV set and order it to record a programme," Mathes said. (See *News Analysis, p44 and Interview, p156*)

Mutoh plotter is a cut above the rest

Computers have helped build a new class of cottage industries. Plotters like this can be fitted with a variety of tools for cutting out cloth or vinyl and even heavy rubber stencils for stone-masons. The MC-1650 (pictured) costs all of £9,995 but Mutoh (01295 252552) says many one-person sign-writing businesses have been built around equipment costing about £5,000.



Short Stories

Take on the software that beat Kasparov

■ Extreme Chess, the software that has beaten Garry Kasparov and IBM's Deep Blue, has been released by Zablac. The £39.99 Win95 and 3.1 game has a database of millions of moves, a library of 10,000 classic games, coaching options, and customisable 2D and 3D chessboards. It is available through computer retail outlets.

NT 4.0 defragger

■ Executive Software has followed up the only defrag for Windows NT 3.x with the only defrag for NT 4.0. Registered users of Diskkeeper 1.x can download it from www.execsoft.co.uk

Not a dry eye in the office...

■ Hours spent staring at a PC screen can cause "dry eye", which stems from infrequent blinking and a dry atmosphere. Eye drops have to be renewed too often but two or three drops of GelTears can last all day, according to its makers. It is available from high street chemists and ophthalmologists.



Boom in DIY as users build more home PCs than Compaq

The number of people building their own PCs has risen dramatically, according to a new Inteco report. They account for seven percent of new home PCs — just one percent fewer than those sold by IBM, which is back at the top of the home sales league.

Hewlett-Packard and Packard-Bell come next with six percent, while Compaq dropped, in six months, from a high of nine percent to four percent — the same as Gateway 2000, Olivetti, Panrix, and Tiny.

No fewer than 14 companies took a three percent share, indicating that users have become far less influenced by brand names. Pete Day, Inteco senior consultant, agreed that the figures may indicate a greater maturity both of users and the

technology. "The people who built their own were not repeat buyers as you might expect. They were first-time buyers who got a friend to advise them."

They were also more confident that the components are available. "It's about plug and play. They believe that if they buy the parts and fit them together, they will work."

Buyers of assembled PCs chose mainly on price and value. Curiously, Compaq was cited most often as a brand considered.

Escom led the tables last year until it went bankrupt, partly due to cost cutting. Day said: "This is a very competitive market. You wonder how anyone can make any money out of it."

Inteco 01483 751777

Top 10 Windows software

		Last month	
1	Encarta 97	Microsoft	2
2	Win95 U/G with Internet Starter Kit	Microsoft	-
3	Flight Simulator 6	Microsoft	4
4	Word Bundle	Microsoft	1
5	Office 95 Professional (student)	Microsoft	10
6	Masterclips 101,100	IMSI	6
7	AutoRoute Express V.5 (GB)	Microsoft	5
8	Corel Mega Gallery	Corel	-
9	First Aid Deluxe	R. Manhattan Grp	8
10	Partition Magic	POW Distribution	9

Top 10 DOS software

1	System Commander	POW	1
2	Partition Magic V.3.0	POW	-
3	Command and Conquer (Red Alert)	Virgin	-
4	Total Insanity CD	Europress	4
5	Novell Groupwise 1USR VLA	Novell	2
6	MSDOS V.6.22 Upgrade	Microsoft	3
7	Quake Full Release V.1 CD	Gem	6
8	Procom for DOS	Datastorm	48
9	Turbo C++ V3.0	Borland	5
10	DOS 2 Win95 UG with Inter.	Microsoft	15

Top 10 CD-ROMs

		Last month	
1	Star Wars Trilogy	One Stop	3
2	Babylon 5: Ltd Edition Entertainment	One Stop	-
3	Encarta 97	Microsoft	1
4	Inside Independence Day (HMV Exclsv.)	Electronic Arts	2
5	Beavis & Buttthead Screensaver	Tring International	-
6	Cinemania 97	Microsoft	-
7	Music Central 97	Microsoft	-
8	Encarta 97 World Atlas	Microsoft	5
9	Mavis Beacon Teaches Typing V.4	Mindscape	-
10	Rockbase: Ultimate Music Directory	CravenPlan	-

Top 10 peripherals

1	Screenbeat Passive Speakers	Hitex	10
2	16-bit Plug'n'Play Asound sound card	Asound	4
3	Primax 4,800 Direct Flatbed Scanner	Primax	8
4	Epson Stylus Color 500	Epson	6
5	Goldstar 8x CD-ROM Drive	Goldstar	14
6	MiroConnect 34	Miro	1
7	Philips 28,800 External Fax Modem	Philips	2
8	USR 33,600 Ext Voice/Fax Modem	US Robotics	16
9	Aztech Sound Galaxy Pro 16	Aztech	25
10	10x Aztech Multimedia Kit	Aztech	-

Software and peripherals figures supplied by Software Warehouse. CD figures courtesy of HMV Games/Level One

Net gain in the City

Jonathon Savill reports on the man who proved that you actually can make money from the internet. How? By raking in £40 million in eight months.

There are basically two ways to make money from the internet. The first is to collect a pound from everyone who tells you that you cannot make money from the internet. This is sure-fire, if a little slow and tedious. The second requires a somewhat more lateral thought process: why not take something that everybody wants anyway and put it on the internet?

This approach can work spectacularly, as is shown by the story of Peter Levin, managing director and entire staff of an English company called Display.IT. Levin once spent most of his time building dealing rooms. These are expensive, large, and dedicated to exchanging currencies, and to trading stocks and bonds. They are always in expensive city areas and full of expensive people earning huge salaries. They also use expensive hardware. For instance, dealing rooms account for the majority of sales of flat-screen LCDs, and as everybody knows, these don't

come cheap. Amid all this costly hardware, these buildings and livestock, the most expensive item of all is financial information.

The industry is worth \$8 billion annually, worldwide. Eight companies, known colloquially as Reuters and the Seven Dwarfs, control it. Reuters itself has 41 percent of the turnover but only 33 percent of the 880,000-or-so dealing screens worldwide. Each screen costs about £20,000

per annum and feeds constant real-time data to the dealer. Levin realised that many dealers only occasionally need the information to be in real time — that is, at the point they make the deal — but are always forced to pay real-time charges. He came up with several clever, if unconventional, ideas. Firstly, why not call up the real-time stream just when you need it, to comply with the law? Secondly, why not use the internet to distribute the information? And thirdly, why not make £40 million in the first eight months of trading? Levin has achieved all of this.

Every facet of his company is out-sourced: the development was done out-of-house, the invoicing is

handled by a large city accountant and the sales are made by resellers. And training? Well, he just used a screen layout and terminology to which users could easily adapt.

The banks find themselves in something of a dilemma with Mr Levin's system. In one way they have a natural reluctance to use the internet, yet are tempted by a cost saving of around 90 percent over existing data feeds. Levin has spent a lot of time in this industry and is sure that in the end, the savings will win them over. Even now, about twelve major institutions, representing around 40,000 screens, are using this product alongside their current systems.

Alasdair Macleod, of stockbroker Shaw & Co, explains: "The real beauty of Display.IT is that it takes a lot of the demand away from overcrowded in-house systems. The internet co-mingles with systems owned by the banks to deliver a staggering amount of nearly real-time prices, also delivering real-time information to people who need it constantly, like foreign exchange dealers."

In effect, the system offers a financial web browser throwing out links to sites where the information is provided free. It does not republish it. The system was launched in April 1996 and is being sold at different levels for traders and investors. Investors who manage personal portfolios, and who currently rely on teletext and newspapers, can now put a reasonable facsimile of dealing room facilities into their homes. And professional dealers will be able to keep an eye on the markets 24 hours a day.

A new market is oil companies, logging on to the internet via satellite phones. They are using it to track share prices from remote sites like Baku and Venezuela.

But bear in mind that Display.IT is not a trading system. For actual trading, the banks use that most secure of electronic communication devices, the telephone. Since June, the company has been signing up with financial information providers such as Standard and Poor's Comstock. Last November, the company gained Windows accreditation from Microsoft for Windows 95 and Windows NT. System support is being supplied by British Telecom, worldwide.

Levin plans to add a million users to Display.IT's network during the coming year, and the plan includes bundling the software with new computers and modems. It will also be provided with financial software packages that may be given away by telecom companies who see it as a way of generating "times and lines" usage.

(Display.IT software costs £79.95 to individuals) ■



Success story:

Peter Levin worked in the City, building dealing rooms, before starting his own company, Display.IT, providing financial data on the net

Just the Jobs for Apple

Steve Jobs returns to Apple, officially to integrate NeXT into a future Mac OS. But how else might he influence the company's fortunes? Tim Bajarin reports.

If Hollywood had written the script for the recent events at Apple, the plot would have been rejected as implausible: *A high-tech company, created in a garage, boots out one of its founders having achieved world success. Twenty years after the company's launch, it has hit hard times, and the founder returns to lead it into the next century.*

As I stood with CEO Gil Amelio and founder Steve Jobs following December's press announcement that Apple was bringing Jobs back to the fold and buying his company, NeXT Software, I could not help shaking my head in disbelief. The return was dripping with irony and sweet revenge for Jobs, who left Apple and started NeXT after a bitter feud with John Sculley in 1985.

NeXT was to be the next great computer and was supposed to help Jobs extend his legacy beyond his Mac days. At the time, I felt Jobs was doing this to spite Sculley and Apple, but he succeeded in creating a serious computing platform and, more importantly, an object-orientated operating system.

His hardware project failed, but the OS was ahead of its time. Apple will use it as the core of the next MacOS, giving Jobs the chance to fulfil his promise to create the next great OS and desktop computing system.

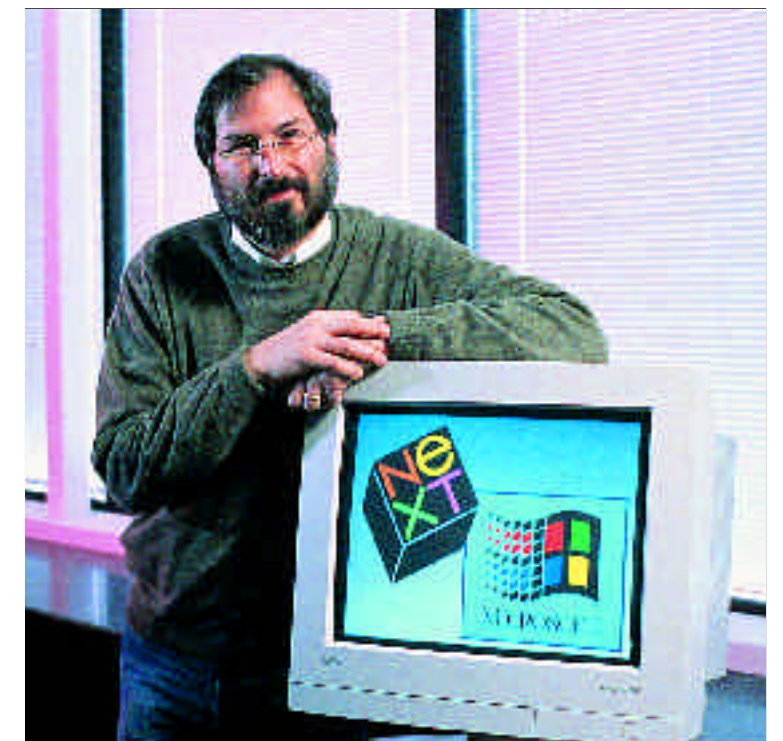
Jobs turned full circle in early January when he joined Amelio on stage at MacWorld, which began a year-long celebration to mark the 20th anniversary of Apple Computer. And there, too, was his boyhood friend, Steve Wozniak, who put together the first Apple computers.

It is too early to understand how the new OS can save Apple from the fiasco of its much-delayed Copland next-generation operating system, but one thing is clear: Jobs brings the excitement and vision of which Apple is in dire need. Amelio and his management team are more than capable of running the company but they are dull compared with Jobs, whose flamboyant style, charisma and plain old schmaltz have made him a Silicon Valley legend. His actual role will be minimal; officially, he will be a consultant involved in integrating NeXT into Apple.

I suspect that in the short term he will work with both engineering teams as they try and figure out how to meld the two diverse system architectures. His real value will be to Apple's PR department in rallying the troops and customers around the Apple flag.

Apple had one big surprise up its sleeve at MacWorld — to allow Jobs and others to crow about the company's innovative side, a new computer design known as the 20th Anniversary Mac. When I first saw this computer, last

autumn, I thought I was looking at a prop from the set of Star Trek. It does not look anything like a conventional computer. It has a 2.5ft grey panel, curved and sleek, sporting a 12.1in TFT colour display. It is bound to win awards for innovative design and could signal a sea



change in the way that personal computers will look in the near future.

This, plus the return of Jobs, may put Apple back into the limelight and, in some people's minds, back into the ingenuity column where it started in 1977. The one problem with the Anniversary Mac is that only 10,000 will be made, and with a price tag of \$8,000, only the digerati of the personal computer and Hollywood crowd will be able to afford one.

And the Anniversary machine could be seen as a sign that Apple has put the *annus horribilis* of 1996 behind it, and that it could again take a leadership role in a market that has pretty much gone the way of Intel and Microsoft.

One thing is for sure: with Steve Jobs back in the Apple world and Apple itself striving to shake up the market, 1997 is going to be a fun year for the PC industry as Apple makes its bid to turn itself around and remain in the public eye. ■

Steve Jobs, founder of Apple and NeXT Software: His return to the "Apple-barrel", will bring much-needed excitement and vision to the ailing company

Domestic science

A friendly PC interface would make your video easier to program and give computers a better name among non-users. Clive Akass gets “smart”.

The New Year break gave me cause to rue my scorn of those who moan about the difficulty of using VCRs. My young stepson regards our cheapo Matsui as his personal domain, and I had always left him to set it to record. Suddenly, forced to confront the wretched machine myself, I discovered what everyone had been complaining about. The LCD seemed to have been designed in about 1869 and the instructions, in fractured Asian English, were barely comprehensible.

I was reminded of early PC printers, which had similar displays (if at all) and worse manuals. (I was so enraged by my first Epson dot-matrix manual that I offered to rewrite it. The company declined.) Users and manufacturers alike

took some time to realise that the PC display, rather than a postage-stamp sized control screen, was the best interface for the printer.

But not until the introduction of the bi-directional parallel port, allowing the PC to receive status information, did printer control via the computer become half sensible. There is no reason why there shouldn't be a similarly friendly PC interface to control your VCR and other household devices like your central heating and telephone.

For most users this means leaving the PC sweating away, wasting energy and wrecking the planet for their grandchildren. Companies like IBM, with its Aptiva range, are already working towards integrating computing into the home, but there has been no comprehensive standard to which manufacturers can design.

The new ACPI 1.0 (see *Newsprint*, p38) specification will do for general device control what the enhanced parallel port did for printers. It provides a two-way control path, as well as supporting power-conserving sleep states. This will make it more practicable to use a PC as an answering machine, fax, or remote video monitor.

But options for the computerised home are rather more complex than the model of having a single controlling PC. You could, for instance, control your video via the TV screen. This can be done with the current, conventional setup but it should be very easy indeed with web-enabled TVs incorporating a computer — you could even set your video over the phone.

Similar “smarts”, as the Americans say, are going to become commonplace in consumer items as diverse as telephones and toasters. We may thus get a distributed-computing environment in which home machines converse and negotiate with each other like people.

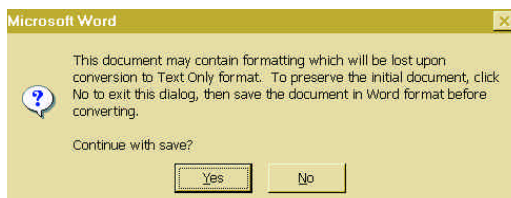
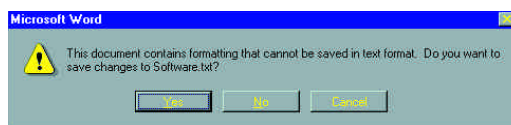
Acorn (see *Newsprint*, p38) and Diba are two of many companies thinking along these lines. Diba's Farid Dibachi (see p156) believes the market for information appliances that do one or two tasks very simply and cheaply will eventually dwarf that of PCs. This could change the general perception among non-users (most people in the world, by far) that computers are hard to use. The general-purpose PC is daunting because of the breadth of what it can do, but it is complicated rather than difficult; no single task is any more difficult than making a cup of tea.

Consumer electronics manufacturers could learn a thing or two about usability from the PC market, where an interface like that on my video camera would be laughed off the shelf. They might find that a few extra pounds spent on manuals is worth millions in customer satisfaction. ■

The word on Office 97

Microsoft will watch sales of Office 97, which hits the shelves this month, with more than usual interest. There is a limit to the features the company can add, and users are already complaining that office suites are too cumbersome. In fact, I love the new on-the-fly grammar checker in Office 97's Word 7.0, not because it checks your parsing, which it does only erratically, but because it traps some contextual spelling errors missed by the conventional checker, although it is happy with “Jack and Jill stroked there dog”.

But Word 6.0 will not read Word 7.0 files, so companies will either have to upgrade all their machines or none at all. Many will not bother. Office 97 will sell to new users anyway, but it could prove to be a watershed; the point at which technological change faltered as a generator of software sales for Microsoft. The time may come when Bill Gates looks back at the writing on the wall, and sees that it was written in Word 7.0.



It seems that I was not the only user confused by the cautionary message (top) thrown up by Word 6.0 when you save a document file as text. It encourages you to re-save, but gives no indication of whether this will overwrite your format-free file. Microsoft has got the message from users and offers a new version in Word 7.0 (above)

A frosty evening in mid-December, and off we trudged to the Cornish premiere of Star Trek: First Contact at the Penzance Savoy. The Savoy is one of those cinemas which aspires to be a multiplex but, because of size constraints, can only make it into the duplex league. Nevertheless, it's got a cosy, intimate feel inside; rather like watching television in your own living room, except the screens are a bit smaller.

Anyhow, 20 or so minutes into the film, on came the villains (the Borg) and there was a dramatic chase sequence through the corridors of the Enterprise. By this stage, something was beginning to nag at me. It wasn't the fact that even though the Borg were trudging along at, maybe, 1mph max they nevertheless managed to overtake Picard and co, who were legging it off at sprint speed. No, it was something else.

I turned to my companion, pointed at one of the heavies on the screen, and asked, "Where have I seen him before?" "Shhh!" she replied. It was only as the end credits rolled that the penny dropped. I'd actually seen him that very morning in colleague George Cole's piece on wearable computers ("*Dress code*", *PCW Jan*). If you've still got your copy, take a look at the illustration on page 112: the guy with the head-mounted display and the peripherals; it's none other than a business-suited Borg. It's what you'd end up with if the Borg Collective ever assimilated Lloyds or Citibank.

For the benefit of the non-Trekkies among you, perhaps I should explain. Basically, the Borg is a race of space-trotting humanoid-machine hybrids, or cyborgs. They're rather like members of the Unification Church. Instead of each thinking for himself and having an individual identity, they all think the same way and share one, big, collective identity. A "hive mind", as Kevin Kelly might put it. And like Moonies too, they seem to be on a permanent recruitment drive. This involves flitting from galaxy to galaxy, forcibly signing up, or "assimilating", new converts. Rather than employing the standard opening gambit of "Good Morning. Have you ever considered letting Jesus into your life?", theirs is a slightly more Lutheran "Prepare to be assimilated! Resistance is futile!" As far as I can tell, the Borg's eventual aim is to become something along the lines of an interstellar bouillabaisse, comprising a bit of everything and everyone.

Which is fair enough, I suppose. And George Cole's piece described how we might well be on the first rung of the ladder towards that goal, by attaching electronic peripherals to ourselves. But if this is the first step towards our becoming a fusion of computer and organic material, I feel that Star Trek: First Contact teaches us some valuable lessons and shows how we can learn from the mistakes made by the Borg.

Their first big mistake is to travel around in a large, intimidating-looking cube, saying "Prepare to be assimilated! Resistance is futile!" In the long-term, it might

well be. But in the meantime, you piss people off with an attitude like that and they fire photon torpedoes at you. Surely it would be more efficacious to be a bit more subtle, like a cold-calling timeshare or insurance salesman.

"Have you ever seriously considered the benefits of being assimilated, Captain Picard? Can I call you Jean-Luc? How old are you, Jean-Luc? Fifty-three? Fifty-four? And, so far, you've just had the one mind, right? Well, imagine what it would be like to be able to simultaneously tap into hundreds of millions of minds..."

Then there are looks. People say looks aren't important and it's the personality that counts. That's garbage. He might well be a warm, wonderful, cyborg underneath it all, but the average Borg looks like a Hell's Angel having an eye test. And that could put people off. If I really wanted to assimilate a person, I'd ensure I looked like someone by whom he'd want to be assimilated in the first place. Less futile resistance in that way. So I'd try to look like an intergalactic Spice Girl or Claudia Schiffer.

Additionally (and this is where the Borg stretch my credulity to the limit), you simply cannot go around the universe, willy-nilly, from the Alpha to the Delta Quadrants, assimilating everyone in sight. Yes, *en route* you will, of course, assimilate beings of extremely high intellect, whose minds will enrich your Collective whole. But bearing in mind what the philosopher said ("Ninety



Michael Hewitt

Sounding Off

By attaching electronic peripherals to ourselves, we may be in danger of becoming a nation of business-suited Borgs. Michael Hewitt takes a cautionary stance.

percent of everything is crap") you're also going to assimilate a disproportionate number of total dorks: the spaceship-spotters and the net surfers of the universe. The presence of these people in your Collective will so dilute and negate whatever virtues you might have accumulated that you'll end up not as a superior Master Race but a group of sorry cyborgs with the aggregate intelligence of a bunch of Millwall supporters.

The distinction between the biological and the mechanical will disappear and we'll order new bits and pieces for ourselves from Tech Direct. But who will provide our operating system? Not, hopefully, the same outfit which supplied the Borg. ■

We who send dispatches from the front line of technology are terribly fond of analogies. There are two reasons for this. Firstly, it saves us having to think. And secondly, it is a way of presenting alarming new technology in terms of familiar, comfortable, technology. Which in turn saves the reader mental anguish and encourages them to keep buying the magazines that keep us in scotch and memory upgrades.

The only flaw with this fine custom is that the analogies are usually ludicrous. The internet isn't like an information superhighway, it's more like a totally chaotic public transport system except, of course, there's no chewing gum stuck to the seats and you're allowed to smoke. A personal computer isn't like a car — another firm favourite with hacks. Overlooking the obvious (PCs don't have wheels, and you're allowed to operate them when drunk) a five-year-old car is functionally identical to a new one in terms of getting from A to B. A five-year-old PC won't even stagger out of the driveway onto the 32-lane tarmac of Windows 95.

So let's take a look, in cloyingly familiar terms, at the impending arrival of the Net Computer. This is a Good Idea, we are told. It is a Good Idea because it is cheap and easy to use. You won't need to worry about your operating system and software setup because all this will be kept on a remote server and updated automatically.

You won't need to worry about your hard disk getting in a mess because you won't have a hard disk. So where, I hear you ask, will I keep my files? My accounts? My novel? My letters to the Severn-Trent Water Authority? Easy — they are all kept for you on the remote server, freeing you from the worry of backups, disk disaster and burglary. You don't buy that idea? Okay; it's time for me to don my smug, patronising smile and point out that you don't, after all, keep your money under the mattress — you keep it in the bank, where the experts can look after it. And data is, as everyone knows, exactly the same as money.

Reassured now? No, nor am I. I can't even keep the smug smile in place as it seems to have turned into a sardonic sneer. Data *isn't* like money, and banks *aren't* like servers. For a start, the main reason I use a bank is that the mattress won't let me have an overdraft. Secondly, I'm not particularly worried who looks at my money. They can put it in a little pile on the manager's desk and dance around it for all I care. Thirdly, if I pay in a bundle of used tenners, I'm not particularly concerned about getting the same notes back, in the same order.

Fourthly, the bank isn't going to say that I don't have enough room in my account to pay in all that money and would I like to rent some more account space? Also, it doesn't take a

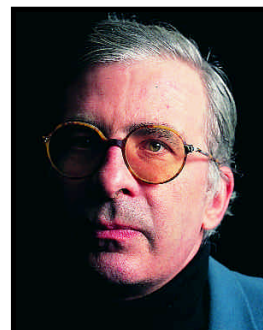
hundred times as long to transfer £1,000 as it does £10. And finally, this is obviously such a silly analogy that I'm going to stop there and go on to another Wondrous Advantage of the Net Computer.

You'll be able to rent software on a one-off basis. You need Photoshop to smarten up those holiday snaps? You need AutoCad to plan that house extension? Easy. Don't buy, but hire for the duration of the project. Just like you'd hire (oh no, here we go again) a car. Except, of course, that learning to drive in your dad's Morris Minor at the age of 17 pretty much sets you up for life in the learning curve department. Most drivers can cope with anything Hertz cares to offer them — even in

strange lands where they drive on the wrong side of the road, have signs in an alien tongue and traffic lights where you can't see them. In terms of skill, driving is pretty much plug and play.

Software, of course, is nothing like this. You may be a whizz at WordPerfect, but that's not going to help much with getting to grips with AutoCad. If you haven't used

“Where will I keep my files? you ask. Easy, they are all kept for you on the remote server ... You don't, after all, keep your money under the mattress, you keep it in the bank where the experts can look after it. And data, as everyone knows, is exactly the same as money”



Tim Nott

Homefront

Tim Nott casts a jaundiced eye over the impending arrival of the Network Computer, warning the gullible against ludicrous analogies which, when applied to new technology, all too easily fall apart at the seams.

the program before (and recently) don't expect to get that extension drawn up in a weekend. You'll need several days just to master the basics. If cars were like software, you'd probably still be trying to get out of the forecourt at the end of the hire period. Not only does the analogy fall apart but the idea, too. So beware of sophists bearing similes. And take to heart the words of Salvador Dali: “The first man to compare the cheeks of a young woman to a rose was obviously a poet; the first to repeat it was possibly an idiot.”

I recently used the internet to buy a book, which Waterstones could not obtain for me. When BT won an injunction to prevent German company, Topware, from selling its UK Info CD-ROM of British telephone numbers, I ordered one through Topware's internet site. In each case I paid by credit card and the goods arrived by parcel post a few days later. Small wonder Forrester Research estimates that by the year 2000, one-third of all businesses will be trading electronically on the internet. But the opportunities for consumer rip-offs are enormous.

Twice, recently, I have heard from people who bought computer equipment in this way and then saw their credit card account debited twice, and even three times, for the same amount. Others have had difficulty stopping card payments at the end of a free internet service trial.

Every local council has a Trading Standards Officer (TSO) whose job is to ensure that businesses in their area do not abuse consumer protection Acts. "It's theft," was how one TSO immediately described multiple charging, "and if it's not theft, the firm is guilty of giving a misleading price indication." So if you are a victim, contact the errant trader's local TSO. Also contact your credit card company. Do likewise if an internet service provider fails to cancel your subscription following a free-trial offer.

The card company sends you a dispute form and takes it up with whoever debited the money without authorisation. When using your credit card online, make a hard copy of the order form or email message. In each case, where a computer dealer had charged more than once for a single delivery of goods, the cardholder got the money back through the card company. (Things could have been different if the dealer had gone out of business in the meantime.) In each case, the dealer benefited from the injection of cash while the dispute was in progress.

The fact that one dealer sent out a standard form letter apologising for the error and blaming a power cut, suggests it is a routine ruse, probably to cope with cash-flow problems. We run similar risks every time we provide a credit card number down a phone line to order a service or goods, for collection or mail order delivery. But most people think twice before giving their credit card number to a trader in a far-off land. An internet address gives no reliable evidence of the trader's whereabouts. Be wary of emailing credit-card authorisation to anyone without a clear postal address. If the address is outside the UK, no TSO will be able to help if the deal turns sour.

In a previous column, I warned that some of today's computer stores have a murky history in the hi-fi and video business. I suggested readers do a little research for themselves. But we soon discovered that there is a yawning gap between what the law offers consumers in theory and what they can expect in practice, from the public servants who are paid to serve them.

In the electronics trade it is well known that in 1989

one dealer was fined £50,000 for a contempt of court action brought by the Office of Fair Trading (OFT). Two directors were fined £10,000 and sentenced to three months imprisonment, suspended for two years. Staff had verbally abused and physically threatened customers, failed to reply to correspondence, refused refunds and made false statements.

We tried asking for names of computer stores that have been in trouble with the consumer laws. The Office of Fair Trading wrote back regretting "...neither the Office of Fair Trading nor Trading Standards Departments hold such a thing as a blacklist of... shops" and "...we are unable to divulge any information relating to ongoing Office investigations." Steve Nicholls, Camden's Principal Trading Standards Officer, wrote: "I regret that I am unable to give out information on individual traders." Paul Cole of the DTI's Department of Consumer Affairs wrote that "...policy decisions of the OFT and of individual trading standards departments are a matter for those organisations and not this department."

The OFT now claims the issue is "timely". A consultation document, published a year ago, explains the OFT's predicament. The OFT keeps a register of prosecutions but the object is to avoid duplicate action by TSOs in different parts of the country. Because the register is computerised, it falls under the Data Protection



Barry Fox

Straight Talking

More credit card payments over the net means more risk of consumer rip-offs. Barry Fox wonders what protection is available to the man in the street.

Act. So data protection laws work against the consumer.

It is a criminal offence to disclose information about old or "spent" convictions, unless disclosure is part of an official duty. Providing the public with information is not an official duty. Ian Blomfield, of the OFT's Public Liaison Unit, offers some comfort. When the OFT successfully prosecutes, it issues a press release. If a member of the public enquires about any dealer by name and address, the OFT sends a copy of the relevant press release.

Meanwhile, the best we can hope for is that someone who works in the DTI's Consumer Affairs department spends their money on a PC and gets ripped off. Then we may see more sympathy for the consumer. ■

Despite, or maybe because of, business computing's heavy dependence on IBM, it has been traditional to give the US giant a hard time. Not too long ago, the name of IBM had only to be mentioned for conspiracy theories to become as commonplace as in *The X-Files*. Then, taken by surprise by the PC revolution, the company's traditionally immense profits evaporated and there was talk of its demise. Right now, IBM seems to be recovering, but while Microsoft still holds the role of the firm we love to hate, I'd like to celebrate one of IBM's largely forgotten triumphs.

This isn't one of the many hardware breakthroughs to have flown from IBM labs, but a programming language called APL. It started as an attempt at a universal mathematical notation but was translated into the ultimate business language for computers. APL combines a stark clarity (even the name is unusually unfussy: APL stands for A Programming Language and there are no silly puns about coffee, here) with remarkable power.

I am reminded of Samuel Delany's science fiction novel, *Babel-17*. A curious mixture of action adventure and linguistics, *Babel-17* features an artificial language so sophisticated that given the name of a device, a *Babel-17* speaker would know exactly how to build it. Although this takes the point to a ridiculous extreme, the concept that language can contain coded information while remaining compact is quite genuine. Take three terms for a fox's abode: "fox's den", "fox's lair" and "fox-hole"; all are roughly the same length. Each tells us that a fox is involved, but the second adds the information that the fox is a sneaky, cunning animal, while the third tells us something of the physical nature of the housing. APL is the *Babel-17* of computer languages. It shoe-horns remarkable power into extremely short lines of code.

So why hasn't APL taken the world by storm? The first problem is purely practical. To be able to express complex concepts in a few characters, APL had to introduce new symbols to the character set. In the early days, this was a nightmare. It meant having a special keyboard built, a special printer, and a special screen for the hard-wired characters. The introduction of graphics screens made things easier, as weird symbols could be generated just as simply as any others, but there still had to be clumsy key combinations or irritating palettes to select these characters.

Even when you gained the ability to type APL, there were still several snags relating more to people than to technology. There was a reluctance to learn what has never been more than a niche language. Conventional programmers, trained at college to sneer at the interpreted nature of Basic — the ability to type a line of code and have it work immediately without first passing it through a compiler — were suspicious of the fact that

APL did not have to be compiled.

More difficult for the corporates, though, who like to consider their programmers as a pool of resources rather than individuals, was the need to be extremely selective. APL would never be a language for everyone. To be an APL guru requires the ability to visualise multi-dimensional matrix operations as naturally as most of us can cope with simple mental arithmetic. Just to be competent at APL requires twice the mathematical ability of any other language. What's more, the very power of APL is a problem in itself. Code is so dense that a whole program can be contained in a single line. While intensely elegant, this does not make it easy for a new programmer to come along and try to understand existing code.

So what makes APL so great? In part, its sheer power. It's all a matter of databases. To the business world, information technology is often concerned with taking huge amounts of data and compressing it and slicing it up in different ways. This is not at all easy with the rigid structure of a traditional relational database which tries to hold each piece of information in a single place. Relatively recently, Ted Codd, the man responsible for the mechanics of relational databases, came up with an alternative database called OLAP (OnLine Analytical Processing). Instead of holding each piece of information once, an OLAP database puts it



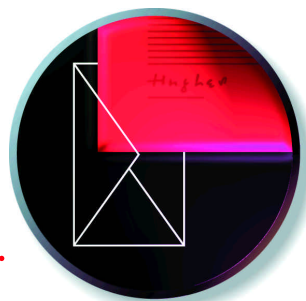
Brian Clegg

Business Matters

Why hasn't A Programming Language taken off, asks Brian Clegg? With two squiggles and a slash, an APL programmer can turn your company's data inside out.

everywhere it is referred to, producing multi-dimensional hypercubes of numbers that are consequentially much easier to slice up into comprehensible chunks. Sounds familiar? It ought to, as APL is inherently multidimensional and eats hypercubes for breakfast. With two squiggles and a slash, an APL programmer can take your company's performance data, categorise it by country and split out the poor performers.

APL still exists on some mainframes and in quite sophisticated versions for the PC, but its day never truly came. Despite all the difficulties, it's a shame — APL was elegance itself. ■



Letters

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Vale of tears

We were amazed to hear that our Vale P200, reviewed in your February issue, has poor expansion. Not the machine we sent in.

The Vale submitted for review comes with four empty 3.5in bays (two internal and two external); not one internal and one external as described by your reviewer. There are also three empty PCI slots and one empty ISA slot; not three ISA and one PCI, as you described. Bearing in mind that the system also has an internal 33.6 modem and a wavetable upgrade, there is plenty of room for expansion.

In the body of the review, the speakers are complimented for their power; yet the box-out, which incorrectly describes the Zyfi as Yamaha speakers, damns the product.

Finally, the warranty information is incorrect. On-site warranty should be second-year option at £69 and the second and third years at £149.

Richard Austin, Managing Director, Evesham Micros

PCW replies: We apologise for these errors. You'll find a (more accurate) review of Evesham's latest Platinum DXSE Pentium MMX machine in our group test which starts on page 166.

No origin of cause

In his reply to Prof. Dawkins (*Letters, Feb*) Dr Beardwood referred to "...the origin of cause which first gave rise to the universe out of nothing".

Quantum mechanically spontaneous events have no origin of cause. Quantum electrodynamics (QED) is full of causeless, non-deterministically random and other counter-intuitive phenomena, and experiments regularly demonstrate the reliability of QED to predict such events. Perhaps Dr Beardwood is a doctor of theology?

Regarding intelligence, consciousness, personality, morality and free-will: these are culturally-defined terms used by humans to label collections of predominantly social behaviours which we exhibit and can discuss, but do not understand. When a computer exhibits and discusses those behaviours, then it will be intelligent and conscious, and have a personality and a moral

conscience. The only reason that we don't already attribute these terms to dolphins, apes and other species is our current inability to discuss the issues with members of those species.

Should a program exhibit those behaviours? I suspect that most people will speak of computers as having free will, if only to maintain their belief in their own free will.

If some readers have the impression that I don't regard theology as a truly academic subject, I wish to make clear that such an impression would be a profound understatement.
Terry Browning
terry_b@globalnet.co.uk

Platform plea

As you rightly point out in your Editorial (*PCW Feb*) "...many have decided not to bother

upgrading to Windows 95...". Quite so. There are thousands of people who, for one reason or another, are intending to stick with Windows 3.1x for the foreseeable future.

Underwhelmed by the numbers making the transition, many software companies are continuing to develop and release dual versions (Win3.1x/Win95) of their products. But not all, though. When reading the review of a new or upgraded piece of software, Win3.1x users need one piece of information above all else — an indication of the operating-platform(s) on which that software will run.

Your recent record in this area is patchy to say the least. For instance, from the same edition of *PCW* it is impossible to tell whether four of the seven software products covered in your First Impressions section will run under Windows 3.1x. They may, of course, but the text is silent and the screen-

Chewed up over ChipChat

■ In ChipChat (*PCW Feb*) there was a piece about a web site where you could stick a fork into a baby's head. This is sick and disgusting; not the sort of thing you expect to see in *PCW*. I hope nothing else like this will be published again.
Peter Goss
106431.2747@compuserve.com

■ I was appalled to read the ChipChat page in February's edition. The snippet about a completely tasteless web site dealing with sticking a fork in a baby's head was the pits. It is this sort of gratuitous violence that gets the web a bad name,

and to advertise it free in your magazine is disgraceful.

I am aware that this sort of thing exists on the web, but that doesn't excuse your light-hearted treatment of it. Please try to maintain a sense of taste and decency in *PCW* in future.
John Clifton
john_clifton@systemsunion.com

■ *PCW* is my favourite PC magazine and I have been reading it for many years. During that time I have never found anything to complain about, until reading the February edition of ChipChat. I refer to the item about the

baby, which you seem to have printed with considerable glee. There is no sense of disapproval and the whole thing is treated as a joke from start "...but I couldn't eat a whole one" to finish "If you feel like digging in, check out...".

The entire thing considerably lowers the tone of *PCW*. This is not the kind of tasteless stuff I expect to find in your magazine.
Julian Beach
via the internet

PCW replies: We apologise to anyone who was offended by this item which was intended to be satirical, not gratuitous.

shots all show Windows 95. As for the CD-ROMs (again, *PCW Feb*) the operating platform is a matter of guesswork in nine out of ten cases.

The message is simple: for

as long as a significant proportion of users continue to run their PCs under Windows 3.1x, *PCW* should put platform details in its "PCW Details" boxes at the end of reviews.

And advertisers: please put platform details in your advertisements. Come on, guys — we're not psychic!
Noël M Cooper
CompuServe 106056,3642

The PLL Trust needs donations for the disabled

■ I am writing on behalf of the PLL Trust charity. The aim of the charity is to lend free computers to the disabled in rural Devon and Cornwall and provide free IT training where possible, in the hope of either assisting disabled people into employment or simply improving their lifestyle.

I hope that through the pages of your magazine we may thank all the companies who have supported us during the past five years with funding and donations of equipment. We are a small charity, run entirely by volunteers, and

can't afford the luxury of paid fund-raisers.

I would like to ask anyone who is able to help by donating computer equipment such as 386s, software, disks, monitors, keyboards — in fact, anything associated with computing or IT — to please contact us. Such donations will be placed with a disabled person to use at home.

Jeremy Rundle
The PLL Trust
2 Plestin Close
Launceston
Cornwall PL15 8XJ
Tel: 01566 774212

It's all in the game

Has Tim Bajarin gone mad? In his News Analysis, "The future is bright" (*PCW Feb*) he wrote: "The days of dedicated game machines are numbered ... but a flexible entertainment PC is more attractive as a home entertainment system."

The average games player is not going to spend £1,500 on a PC which will be useless for games in a year's time, when they could spend £250 on a games console that will remain up to date for around two years.

Tim Bajarin has obviously not played many console games, otherwise he would not be predicting their imminent demise. The lurid fact is that PC games, with a few exceptions, are inferior to console games, particularly with regard to arcade-style titles and RPGs.

Richard Craig
rj-craig@clandestine.demon.co.uk

OS/2 out on a limb

Although I can buy any number of computer magazines to satisfy my Windows appetite, I would be hard pressed at present to find a suitable replacement for *PCW* which gave me any coverage of OS/2, let alone of the quality provided by Terence Green. But I would have thought that more OS/2 software could be evaluated. The new Microsoft Office 97 is not yet generally available and is being touted and reviewed as

the next greatest thing since sliced bread; whereas the Lotus OS/2 Office Suite hardly gets a mention, let alone a review.

Mike Cogman
mcogman@cix.compulink.co.uk

A world beyond Windows

I am sure that I am not the only reader to be disappointed by the patronising reply to Matt Dudbridge's letter (*PCW Feb*). As a serious user of various operating systems (Windows 3.1, 95 and MacOS) I look to the long-established *PCW* for unbiased advice written in the interests of the consumer, rather than the industry.

Your negative comments about Apple are misleading when you consider the multitude of innovations from Apple which are not widespread. It is only since the introduction of Windows 95 that Wintel users have had an interface which offers anything like the ease of use and functionality of the MacOS. Competition is vital to ensure progress within the computer industry and I look to *PCW* to support it. Reading *PCW*, one would be forgiven for thinking that alternative computers/operating systems to Wintel simply do not exist.

If only to allow benefits to trickle down to Wintel users, surely you should be using your considerable influence to maintain a healthy competition,

rather than to suppress it? Dr GW Aylward
Bill@promed.compulink.co.uk

Now is the time to cover NT

Regarding Richard Alberg's letter (*PCW Jan*), I was disappointed in your rather dismissive reply. To recap: he was trying to encourage you to feature NT compatibility in your

product reviews; a not unreasonable request, I would have thought. You replied by stating that many users were happy to stick with Windows 3.x/95 for now and by inference the compatibility with NT was not important enough for you to include in product reviews.

I have recently completed installing NT 4.0 on a number of

Graphics gripes

■ What is happening to your hardware reviews? Especially your group test of 3D graphics cards (*PCW, Jan*). I compared your results and ratings with those of another magazine which happened to be doing a 3D accelerator graphics card review. The interesting thing was that both magazines' reviews were almost the opposite of each other, except for two instances. Are you both running different benchmarks? Or is it just the hardware setups?

It is very confusing for the consumer wanting to buy a new piece of hardware. How would you write them a recommendation? Tell them to spend £40 on magazines and compare, or take your reviews as gospel?

Tim Roberts
timr@stroudd.demon.co.uk

■ I find it hard to understand how the Matrox Mystique could have been rated so badly in your recent group test (*PCW, Jan*). The previous month, a short review gave it four stars and a glowing report. I have had a Matrox Mystique for four months and I've had no problems with reliability, speed or ease of setup (including new drivers from the Matrox web site). To get these results I believe you must have had a problem with either your machine, your

board, or your software, and would urge you to re-test this fine model.

Chris Firth
CFirth1962@aol.com

PCW's Dylan Armbrust replies: It is true that PCW gave the Mystique a good rating in a previous review. But we specifically stated at the time (First Impressions, Nov '96) that we couldn't adequately test the 3D aspect of the card and thus gave it a conditional approval based on 2D benchmarks (on which it did reasonably well) and our impressions of the specially ported games.

When it came time to test the card again with the emphasis on the 3D elements (in particular the Direct3D tests and games) it did not perform well. This, combined with the difficulties loading the drivers (V3.16) provided at the time, convinced us that the Mystique wasn't up to standard. All the other graphics cards went through the same installation and test procedures and many did better than the Mystique.

Matrox has released many more upgrades, because of continuing bugs, since our group test and is now at V3.20, so perhaps it would fare better today than it did then? Nevertheless, we stand by our original verdict.

our PCs. If my experience is anything to go by, NT will become very popular. It is similar in user interface (now) to Windows 95 and is more robust and stable in use. I would suggest that now is the time to cover NT compatibility in reviews, just as the bandwagon starts, rather than later when it is already rolling. Your readers will thank you for it.

We use Win95, Windows NT 4.0 and Novell NetWare, and I expect the magazines I read to cover all of these, not just the current, most popular one.

Simon "Gadget Man" Coulthurst
gman@globalnet.co.uk

Bad for business

I see that the brilliant satirist who dreamt up the old Nick Beard "Business Matters" column has struck again (Hands On, Networks). Either that, or you have employed somebody who has run a business network for 18 months without backups, who deals with modem problems by attacking his file servers before checking the phone lines, and who throws stuff into his machines without checking the interrupts. When he does backup to tape, he copies the files from the tape to the other server. Why? Such a move leads to the possibility of confusing different versions of the same file — potential disaster for databases.

Networks are an area where, because of their importance to business, *PCW* needs to get it right. Most network administrators do not, and cannot afford to, mess with networks or make expensive mistakes in the way that your columnist seems to. I suggest that you find a competent manager of a business-critical network to write a serious column on the subject.

John Huff
 Manchester



Daytona USA is available on the Sega Saturn, as well as on CD

Gadgets

PCW Gadget Photography by Bruce Mackie

Sony DK-1

If you can't wait for Sony's consumer-targeted DSC-F1 digital camera, due for release by spring this year, here's a higher-end model. Sony's DK-1 captures images measuring 768 x 576 pixels on a PC Card in JPEG format: up to 40 images in fine or 140 images in normal mode may be stored per 10Mb. The DK-1 features the largest zoom range available on any digital camera so far — an impressive 12X, equivalent to a 38-460mm lens on a 35mm camera. The viewfinder is a colour LCD offering accurate composition and immediate verification of images, while a built-in flash and automatic or manual operation should keep all users happy. Access your images from a removable PC Card or the built-in SCSI-2 interface. See next month's First Impressions for a full review.

£1,499 (excl. VAT). Direkttek 01494 471100



JVC GR-DV1 digital camcorder

Weighing 520g with battery and tape, and measuring 43 x 148 x 88mm, JVC's GR-DV1 is the world's smallest and lightest camcorder. Record up to 60 minutes of pure digital video and audio using the recent DV format on compact Mini DV cassettes. The DV format is capable of up to 500 lines of horizontal resolution, beating the highly respected Hi-8 format and, on higher-end models, approaching the quality found on professional broadcast systems. The really exciting aspect for PC users is the possibility of digitally transferring video straight onto your hard disk for editing. Sony has already implemented this on its range of DV camcorders, all fitted with IEEE-1394 FireWire interfaces. JVC's GR-DV1 does not feature a digital video output, but boasts a 10X optical zoom lens and employs a symmetrical vertical design, allowing right or left-handed or eyed operation.

£1,700 (incl VAT) JVC 0181 450 3282



Trust Wacky Kids Pad

Trust assures us that the Wacky Kids Pad will entertain children for hours and that they'll easily learn about computing. Well, they're right about the first bit: graphics tablets of any kind are great fun, and the corn-on-the-cob pen and configurable strawberry button enhance the experience. It plugs into your serial port, can coexist with another mouse, and comes with Kid Pix educational software and drivers for Windows 3.1/95. The 7in x 5in drawing tablet is not pressure-sensitive. Those with sophisticated tastes may be interested in Wacom's ArtPad II, boasting a cordless pen, pressure and tilt sensitivity on its 4in x 5in area, for £135 (plus VAT).

£49.99 (excl. VAT) Trust 01376 501146. Wacom 01703 814939

Alps Humedia keyboard

An ergonomic keyboard aimed at home users of Windows 95. Like the original IBM XT keyboard, the function keys are on the left. Annoyingly, they double up with keys like pgup, pgdn and print screen. After two months of use we can't say this keyboard's a joy to use for intensive typing, but at least it's highly configurable using the Humedia Keyboard Control Panel utility. And games players will like the fancy cursor keys and the programmable games keys. It costs £69 (incl. VAT).

Alps 0800 973405



Logitech Cordless MouseMan Pro

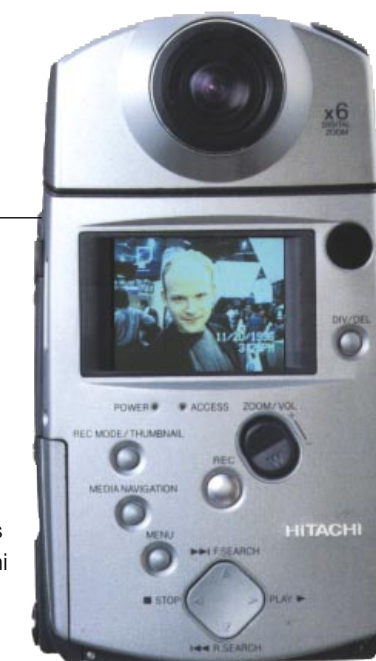
"Never fight with a cord again" says pointing supremo Logitech, with the release of its latest radio-controlled mouse. The Cordless MouseMan Pro uses radio technology to communicate with a receiver, which can neatly be hidden out of the way under your desk. Logitech introduced the cordless mouse concept back in 1991, and this time around it's an ergonomic, cool-looking rodent, complete with a comfortable thumb button and cunning driver software for Windows 95. It also works under Windows 3.1 and DOS, although the design is for right-handed users only. Just make sure you don't lose it.

£59.99 (incl VAT) Logi UK 01306 734300

MPEG-I camera

Here's Hitachi's MPEG-I digital video camera featuring the world's first single-chip codec LSI. Up to 20 minutes of video can be compressed into MPEG-I format in real time, onto removable 260Mb Type III PC Card hard disks. Alternatively, the MPEG camera can be used to capture still frames — up to 3,000 704 x 480 pixel images in JPEG format, or 1,000 images with up to ten seconds audio each. Use the MPEG camera to easily make and transport video clips for presentations, web sites, or straight onto TV or tape with its composite video output. View your images on the colour screen too — just who is that mysterious fellow in our picture? Hitachi hopes to release the MPEG camera at the beginning of 1997 for between \$2,000 and \$3,000, which includes one 260Mb Type III hard disk.

Hitachi Business Systems 0181 849 2000



First Impressions

First Impressions lines up the notebooks: a slimline **Adams** (p72), an **Ergo P166** (p67) and a beefy **AJP** (p68). We look at a **Gateway P5-133** (below) souped-up for net madness, and a **Netscape** web solution (p80). For the best of both worlds we recommend the **US Robotics I-Modem** (p77), but cast a critical eye over the **Axis NetEye** digital camera (p74).

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79	StoryCraft
80	Netscape Communicator
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84	Symantec Norton Utilities 2.0
85	Symantec Act! 3.0
87	Borland C++ Builder (beta)
89	Kurzweil VoicePad Pro
90	Medi8or 3 Professional Edition

Ratings	
★★★★★	Buy while stocks last
★★★★	Great buy
★★★	Good buy
★★	There's a better buy somewhere
★	Buy it and weep

VNU European Labs




VNU Labs tests cover every kind of hardware and software including PC hardware, printers, network products, modems and software applications. The tests are continually developed and enhanced to reflect hardware and software developments.

Our tests closely simulate real-world use. For example, our suite of PC benchtests uses complete versions of industry-standard Windows 95 applications — currently Word, Excel, WordPerfect and FoxPro. We also run a graphics re-draw test using CorelDraw 6, and a Doom2 frame-rate test which is a good indication of games performance.

Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level (or low-level) tests can reliably tell the difference. VNU Labs' system-level test suite is called Euromark. The tests are mainly Windows-based and are used to isolate specific components like hard disks, graphics cards and CD-ROM drives.

■ To make them easy to read at a glance, all graphs are drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.



■ Hardware

Gateway P5-133 Internet

A good-value Pentium with internet capability, suitable for both home and office use.

Gateway's P5-133 Multimedia desktop PC has been given a makeover, a new price and a new identity — the P5-133 Internet. The new machine represents considerable extra value. The inclusion of a EuroViVa 28.8Kbps voice/fax/data modem and a sensitive stalk microphone provides internet capability and adds sophisticated telephony and fax functions. With the Phone Tools software, the PC can act as a speakerphone and voicemail system with remote fax forwarding and message retrieval.

The remainder of the internet software pack includes Backstage Designer, a Get Connected CD-based tutorial program and

the latest version of Internet Sidekick, combining the functions of a personal information manager with basic group scheduling features via internet email. Another enhancement is the provision of a Mitsumi 12-speed CD-ROM drive instead of an eight-speed unit. This provides faster throughput of large multimedia files but we noticed that our review drive took ages to settle down after a new CD-ROM had been inserted, requiring numerous retries before the new disc was recognised.

Gateway has pre-installed and set up most of the bundled software so the computer is ready to use first time out. A special icon on the desktop launches



Internet Explorer to view HTML pages stored on the local hard disk. These tell you how to sign up for a ten-hour internet trial via CompuServe and explain how to get online using MSN or your existing account.

The hardware runs all the pre-installed software smoothly. Overall performance is as good as many 16Mb P166 machines, partly thanks to the fast 2.5Gb Western Digital AC32500 hard disk and the integrated ATI Rage II 3D graphics system with 2Mb of SGRAM. Another component built onto the Intel VX motherboard is a Vibra 16 sound chipset outputting to a pair of Altec Lansing ACS41 active speakers. These provide rich, undistorted sound when set at a moderate volume and have separate bass and treble controls, plus a jack for an optional sub-woofer unit.

The CrystalScan 500 15in monitor performs far better than Gateway's Vivitron models. It is controlled by five buttons and an on-screen display, enabling control of pincushion, trapezoidal and rotational

distortion, and providing colour correction and a zoom feature to expand the display to fill the screen. With a maximum refresh rate of 120Hz and non-interlaced output in 1024 x 768 mode at 75Hz, it's a good match for the onboard ATI graphics controller.

The Gateway is an excellent platform for future expansion. The case measures 182 x 436 x 420mm (HxWxD) and there's plenty of room inside. The uncluttered design of the VX motherboard provides two ISA and three PCI slots capable of taking full-length expansion cards. There are two internal 3.5in drive bays and two 5.25in bays with external access but unfortunately, as the motherboard is mounted on a raised metal plinth, one of these is partially obstructed and can only be used for a 3.5in device.

As well as being suitable for the office, the P5-133 Internet would make a great family PC. It comes with a stack of practical and entertainment software from Microsoft, a ProPad games controller and six CD games.

Paul Wardley

PCW Details

Price £1,249 (excl. VAT)
 Contact Gateway 2000; 0800 552000
 Good Points Price. Performance. A comprehensive set of bundled software.
 Bad Points Bulky design. A question mark over the choice of CD-ROM drive.
 Conclusion Well built and well specified, the P5-133 is an excellent all-rounder and not just for dedicated net-surfers.

★★★★

Performance results

Test	Gateway P5-133	Mesh Elite P133 Professional
Windows 95 Office application benchmarks	2.13	2.22
Doom2 benchmark (frames per second)	61.12	60.32

We compared the Gateway P5-133 Internet with the Mesh Elite P133 Professional, which won the last P133 group test in PCW August 1996. As you can see, the scores are almost identical, the Gateway just falling down slightly on the Windows 95 tests.

Hardware

Sun JavaStation

A network computer no bigger than a modem and available in three different specifications.

The JavaStation, like other network computers, is aimed at the corporate market. The basic idea is to reduce the cost of ownership associated with the PC by providing limited features to the end-user and simplifying administration by centralising the whole network model. Users are left with a thin client which allows them access only to those applications they need; hence the JavaStation, like other NCs, resembles a dumb terminal. The box itself is not a lot bigger than a modem. It has no hard disk and no OS of its own, just a MicroSparc 100MHz processor and its own RAM. All the setup and configuration is done at the server end, where the client is given ethernet and TCI/IP addresses and allocated a boot image. Once these details are in place, the JavaStation is plugged in and polls the server until its ethernet ID is



recognised. Its entire operating system and browser (written in Java) is then sent down the wire and condensed into 5Mb of RAM. Applications are downloaded on demand and executed locally.

There are three models of JavaStation, 8, 16 and 32, depending on the amount of RAM installed. We looked at the highest-end model and ran a sequence of custom Java apps supplied by Sun. Downloading the apps was a slow business but once running in local memory, most of them ran at an acceptable speed.

The first incarnation of JavaStation is aimed at developers providing the HotJava browser and toolkit. Further enhancements are planned for the coming year, including a series of desktop apps (named "HotJava Views") and support for flash memory, allowing remote links over a modem.

Eleanor Turton-Hill

PCW Details

Price Basic model (8Mb) £519; (16Mb) £610; (32Mb) £780. All excl. VAT.

Contact Sun 01276 451440

Good Points Easy setup and administration.

Bad Points Slow performance on graphics.

Conclusion Sun's picoJava chip (optimised for Java code) is expected to arrive later this year and, according to Sun, should boost the JavaStation's performance by as much as 20 times, so hold out for a while before investing.

★★★

Ergo Triathlon

A blisteringly fast, well built notebook with a keyboard port and a swappable CD-ROM drive.

The Ergo has a similar spec to the AJP with 32Mb of RAM, but has a P166 processor rather than a P200. In other ways, however, it is very different. It is just under 2in thick, quite a bit slimmer than the AJP and grey rather than black. Our review model had an 11.3in TFT screen although 12.1in screens are now standard. The keyboard has less travel but makes up for it by being more positive. The

backspace, enter and cursor keys are all a bit on the tiny side but perfectly

adequate once you get used to the keyboard. The Lithium Ion battery pack slides out from under the keyboard and is fitted with a "gas gauge" — LED indicators to tell you how charged the battery is.

The 2Gb hard disk is larger than average for a notebook. And unlike many others, the Ergo Triathlon is a dual-boot system loaded with Windows 95 and Windows NT. There's a PS-2 style external keyboard port, too. In my experience a £20 external keyboard will do nearly as much to increase your productivity on a notebook as a docking station costing hundreds of pounds. There's a handy external thumbwheel volume control, too. At the back, the ports have cleverly designed foldaway hatches and won't break off accidentally. The eight-speed CD-ROM drive is easily removable — you can swap in the external floppy disk drive instead. The combination of the NeoMagic 128-bit graphics chip, with 2Mb RAM and Intel mobile chipset (the

430TX) makes this a blazingly fast machine.

Ben Tisdall



PCW Details

Price £3,045 (excl. VAT)

Contact Ergo 0115 914 4144

Good Points Well designed, well made.

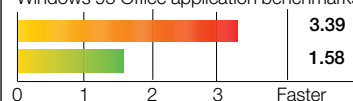
Bad Points Some keyboard keys are a bit dinky.

Conclusion Outstanding machine.

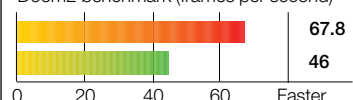
★★★★

Performance results

Windows 95 Office application benchmarks



Doom2 benchmark (frames per second)



Legend: Ergo Triathlon (orange), Dell Latitude XPI CD P150ST (green)

Hardware

AJP 62-200

A solid notebook with a workmanlike keyboard and a mouse pointer that will leave you gasping for breath.



The first 200MHz notebook in the PCW office came from AJP. But why would you need a notebook with this sort of speed? The answer is, presentations. Throw out those tired overheads and try some MPEG video clips instead. On these machines you can comfortably play two or even three video clips simultaneously.

The AJP has a large, 800 x 600 12.1in, TFT colour screen and a workmanlike keyboard. Because the main processor is so fast, the mouse pointer is lively too. It was only by setting the mouse to its slowest setting in the control panel that I was able to use the glidepad comfortably. It is fairly unusual in having both a CD-ROM drive and a floppy disk drive built in, and the penalty is a thickness of nearly 2in. It's a pretty modular design. You can slide out

the hard disk to the left from under the keyboard and marvel at how small and light 1.4Gb hard drives now are. Similarly, both the floppy disk drive and the battery pack slide out in seconds. The batteries are not hot-swappable however, so you have to turn the machine off before you can change battery packs.

The AJP got pretty warm in use. On a hot summer's day you might find the keyboard a bit sweaty (the warmth was okay when writing this review in December).

At the back, sturdy plastic feet unfold from the rear to tip the keyboard forward. There's the usual array of ports, including one for the optional docking station. Overall, the AJP exudes solidity. It's not particularly small, nor particularly light nor elegantly designed, but it soldiers on.

Ben Tisdall

PCW Details

Price £2,099 (excl. VAT), OS £69

Contact AJP 0181 452 9090

Good Points Sturdy, chunky, cheap.

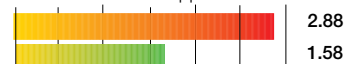
Bad Points Runs rather hot, design lacks finesse.

Conclusion Good for the price.

★★★

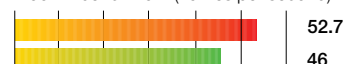
Performance results

Windows 95 Office application benchmarks



0 1 2 Faster

Doom2 benchmark (frames per second)



0 20 40 Faster

■ AJP 62-200
 ■ Dell Latitude XPI CD P150ST



Citizen Printiva 1700

Unusual all-in-one scanner and printer. Produces good results and prints in gold and silver, too.

Citizen is one of the smaller players in the printer market. It makes colour printers using its own solid ink technology, unusual in a market dominated by inkjets, and its new Printiva 1700 is different in other respects, too. It can print in gold and silver. It can achieve up to 1200 x 600dpi in plain black text, and probably the oddest feature is that it has a built-in scanner. I've never been a fan of the all-in-one device. There's always the implicit danger that if one function fails, you'll instantly lose the rest.

Operationally, the Printiva is vastly different from the average inkjet printer. The four ink cartridges resemble cassette tapes and fit into the front door



of the machine. When a print job is sent to the printer it passes through the machine four times, each pass increasing the colour depth. Surprisingly, this had no impact on the printing time of one job compared to the average inkjet printer. One full-page colour photograph takes between six to eight minutes. Scanning is a slightly Heath Robinson process: the rear paper tray must be lowered into its "manual feed" position and your illustration must be placed inside a special paper holder and fed into the manual feed. The scanner driver allows a

variety of options including scanning and printing in one process.

The 1700 produced excellent-quality photorealistic results from our test files (good enough for proofing and pre-press work) but the scanner's crude operation and results were unconvincing. If you need to save space, the Printiva may serve your needs. But if quality is your main concern, spend the extra money on two devices.

Eleanor Turton-Hill

PCW Details

Price £599 excl. VAT (RRP)

Contact Citizen 01753 584111

Good Points Excellent printer with stunning photorealistic output. Space-saving.

Bad Points Scanner operation is badly designed and results were poor.

Conclusion If quality and reliability are at the top of your list, then go for two separate devices.

★★

Hardware

Adams Elite Slim

This notebook is trim, well priced and fully-featured, but the keyboard does not do it justice.

The Elite Slim is the latest notebook from Adams

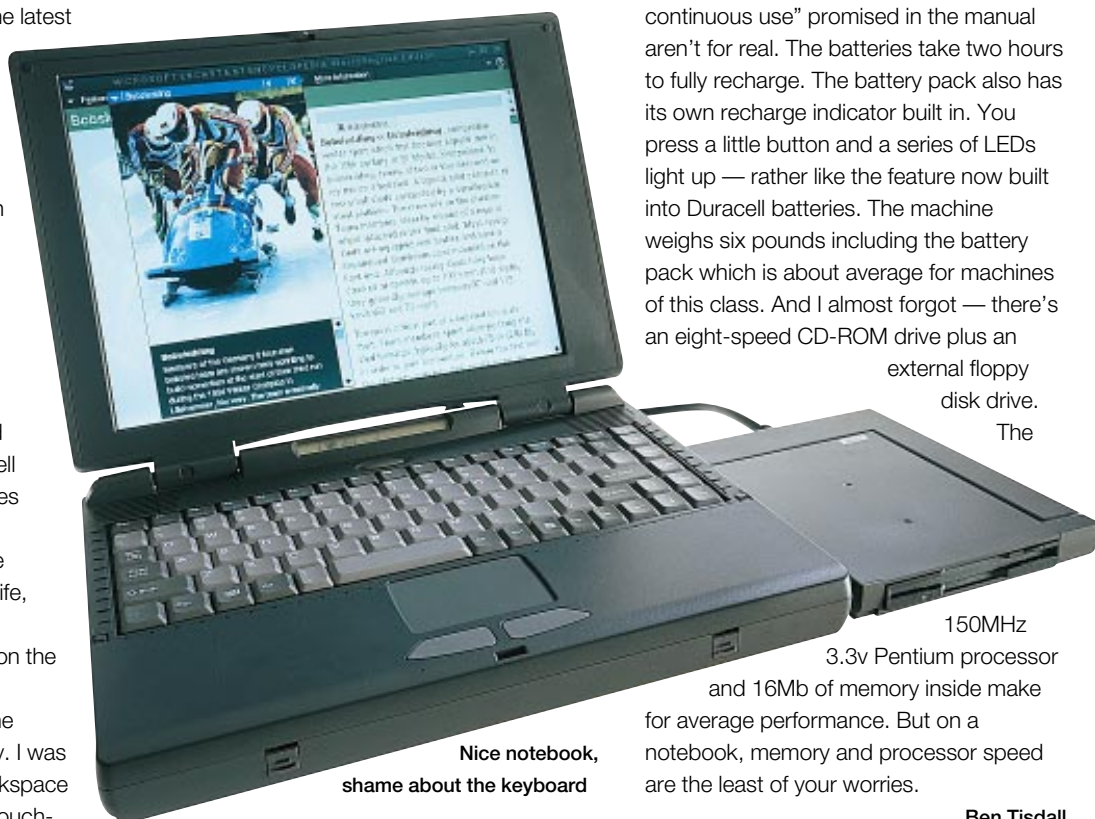
Technology. It's sleek and grey with a 12.1in TFT screen, and at just 1.7 inches thick it's thinner than most. Notebooks, like supermodels, can never be too thin.

The latest generation of notebooks almost all have excellent screens, PC Card slots by the bucketload and neat little LCD panels that tell you what's what. What varies hugely from machine to machine is the quality of the keyboards and the battery life, which is why any notebook review needs to be written on the notebook's keyboard.

To start with I thought the Adams' keyboard was okay. I was only niggled by the tiny backspace key: for slightly inaccurate touch-typists like me, this is a complete pain and is the kind of detail that sets the excellent but pricy IBM Thinkpad keyboards apart from the Taiwanese clone end of the market.

As time went on, other problems with the keyboard became apparent. At intervals the cursor would jump around. Worse, it was very hard to work out which keys, if any, I was pressing to *make* it jump around. Perhaps part of the problem was the glidepad, which works well as a pointing device but with your wrists on the rest tends to send the mouse pointer meandering around the screen. All in all it's a jumpy, coltish keyboard that after a few hundred words had me gasping to get back to my desktop PC. It's not a problem that's restricted to this notebook: I recently tried an HM Systems notebook with the same malaise. It underlines that with a notebook, there's no substitute for trying before you buy.

Apart from the keyboard there was a lot about the machine I liked. Little plastic feet



Nice notebook, shame about the keyboard

fold out underneath to tilt the keyboard to the optimum typing angle. On the left are a brace of PC Card slots plus jacks for speakers, microphones and auxiliary input. On the back is an IrDA infra-red connector plus a hatch covering the docking station connector and one covering the usual parallel, serial and VGA connectors.

At the front, a small hole next to the glidepad conceals a built-in microphone. Behind the keyboard are stereo speakers and between those the LCD indicator panel has icons for things like hard disk access, Num lock, Caps lock and how charged the battery is. Rather cute is the series of Zs that appear when the computer is in suspend mode.

The Lithium Ion battery pack fits ingeniously under the front of the keyboard. It flips up but not without a struggle, and even if you can get the hatch open, the battery pack is not hot-swappable. That said, I encountered no problems with battery life and have no reason to suppose that the "two hours of

continuous use" promised in the manual aren't for real. The batteries take two hours to fully recharge. The battery pack also has its own recharge indicator built in. You press a little button and a series of LEDs light up — rather like the feature now built into Duracell batteries. The machine weighs six pounds including the battery pack which is about average for machines of this class. And I almost forgot — there's an eight-speed CD-ROM drive plus an external floppy disk drive.

The

150MHz
3.3v Pentium processor
and 16Mb of memory inside make for average performance. But on a notebook, memory and processor speed are the least of your worries.

Ben Tisdall

PCW Details

Price As tested £2,069 (plus VAT). Cheaper options with smaller screens are available.

Contact Adams Technology 0161 282 8822

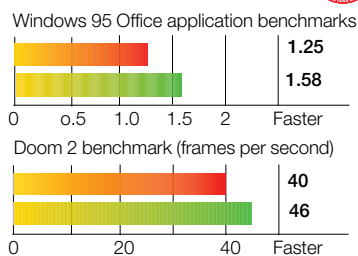
Good Points Fully-featured, slim, cheap.

Bad Points Diabolical keyboard.

Conclusion Okay for posing or for the occasional Powerpoint presentation, but for serious keyboard-intensive use it's hopeless.

★★

Performance results



We compared the Adams Elite Slim with the Dell Latitude XPI CD P150ST, reviewed in PCW December 1996. Both are P150s with 16Mb of RAM. The Adams was well behind the Dell in the application benchmarks, but to be fair, slimlines are generally slower than larger notebooks.

■ Hardware

Creative Labs AWE 64

So farewell, then, AWE 32. But cheer up: express yourself with the great-sounding AWE 64.

The SoundBlaster AWE 32 used to be *the* wavetable sound card. But after several years at the top, it was in danger of slipping in the face of cheaper and, in some cases, better-sounding competition. Thus, Creative Labs has retired it gracefully and introduced a bigger and better replacement — the AWE 64.

So what's new? The 1Mb of wavetable ROM and 512Kb of RAM haven't changed but the AWE 64 has no SIMM slots. Instead, it uses two proprietary RAM connectors that take Creative Labs' own memory cards to give up to 8Mb of RAM. The biggest change is with the wavetable synthesis and the AWE 64 now has 64-voice polyphony. Thirty two voices are through hardware (using the EMU8000 synthesiser) and 32 through software, using the the WaveSynth/WG synthesiser.



Sounds good: The AWE 64 is in fine voice

Software synthesis does, however, make a hit on a PC's processor and the AWE 64 can only be used with a Pentium-class PC. If you only want 32 voices, either synthesis method can be used but both need to be bought into play for greater polyphony.

The advantage of the WaveSynth/WG software synthesis is with the sound. By applying positive filters using something called WaveGuide, samples can be made to sound much more natural and

expressive. The theory is that mathematical models for different effects are stored for samples and can be applied in real time to drastically improve MIDI playback.

The reality is that the AWE 64 sounds fantastic, particularly with the right MIDI file, and samples have a clear, natural timbre.

Julian Prokaza

PCW Details

Price £169 (incl. VAT)

Contact Creative Labs 01734 344322

Good Points 100 percent SoundBlaster compatibility, 64-voice polyphony, great sound.

Bad Points Proprietary memory expansion. Software wavetable synthesis dependent on system resources.

Conclusion Although not the same killer as the AWE 32 was, the AWE 64 is nevertheless a great-sounding card.

★★★★

■ Hardware

Axis NetEye 200

It's Swedish, it's technically interesting and it's clever. But what would you actually use it for?

This oddity is a digital camera complete with hardwired web server containing HTML files and Java code. Plug it into the power supply, connect to the local network and look for the network light — you have a connection.

Then configure the unit by assigning it an IP address. The IP address must be compatible with your own domain, i.e. the first three numbers of the IP address are identical to other machines connected to the internet on your network. To assign an IP address you need to open a DOS window and use the ARP (Address Resolution Protocol) command. Never heard of that? Don't worry: if

you follow the instructions exactly, it will work. This process also assigns the ethernet address to the camera and binds the two addresses. Finally, use the Ping command (also in DOS) to make sure the server is active on the internet.

Type in the IP address in the address bar of a browser and the "home page" located in the camera appears complete with a snapshot image of whatever the camera is pointing at. It takes a new image every three seconds. The standard of image is above average and

the Java applet is the best for quality and speed of download.

Surveillance is one use but conventional systems offer more. And without serious programming there is no way of storing each image for retrospective viewing. So what does that leave?

PJ Fisher



Keeping an eye on things:
The NetEye 200 digital camera

PCW Details

Price £1,095

Contact Axis 01483 797878

Good Points Simple one-unit solution. Excellent image quality.

Bad Points Can be hard to configure. What would you use it for?

Conclusion Other server/camera solutions may be cheaper.

★★

Hardware

US Robotics Courier I-Modem

Dithering between modems and ISDN? Don't. The I-Modem gives you the best of both worlds.

Although traditional modems are still getting faster, they are rapidly coming to the limits of what is possible with analogue technology. So we are beginning to see a shift towards the use of Basic Rate ISDN (Integrated Services Digital Network) which gives you a minimum 64Kbps pipe every time. The problem this gives the PC user who is considering a move to ISDN sometime in the near future is what to buy — a fast modem or an ISDN card/TA (Terminal Adapter)? US Robotics believes the

quick reference card, Getting Started manual, Reference manual, free trial AOL membership and a manual for the bundled QuickLink II comms software. Other software in the bundle includes the USR ISDN configuration manager and a Win95 disk. The latter is a bit of a treat as a lot of ISDN card and TA

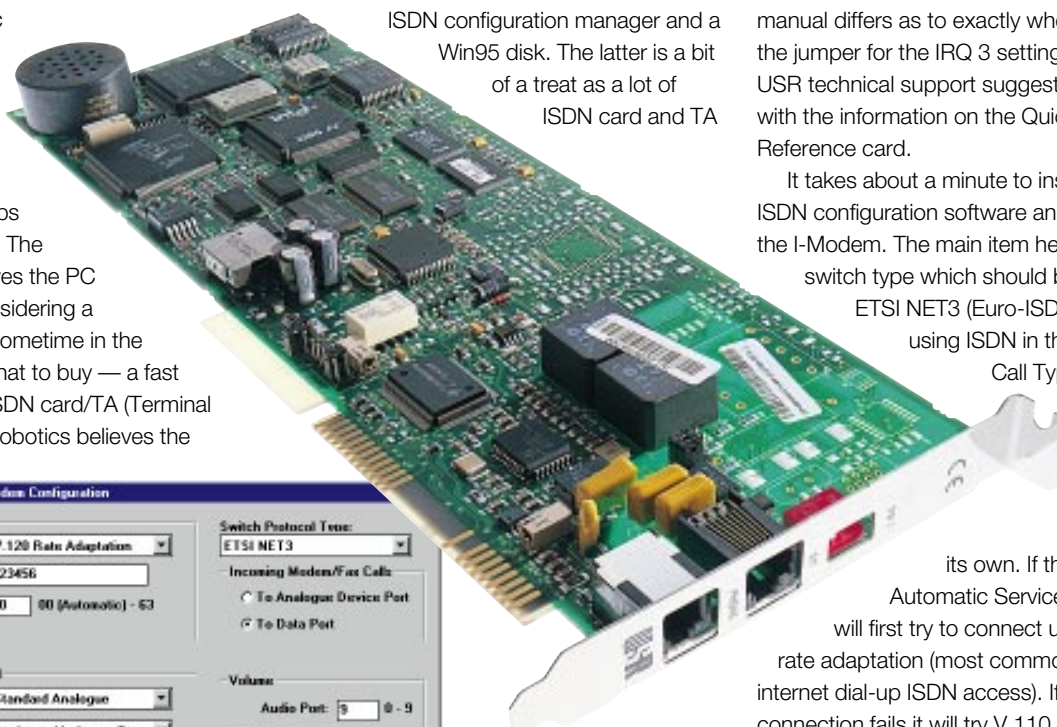
I-Modem. The correct IRQ and Com ports are set via two banks of jumper switches at the bottom of the card and here lies a small problem: the documentation on the Quick Reference card and in the Getting Started manual differs as to exactly where to put the jumper for the IRQ 3 setting, although USR technical support suggests you go with the information on the Quick Reference card.

It takes about a minute to install the ISDN configuration software and configure the I-Modem. The main item here is the switch type which should be set to ETSI NET3 (Euro-ISDN) if you are using ISDN in the UK. The Call Type setting is

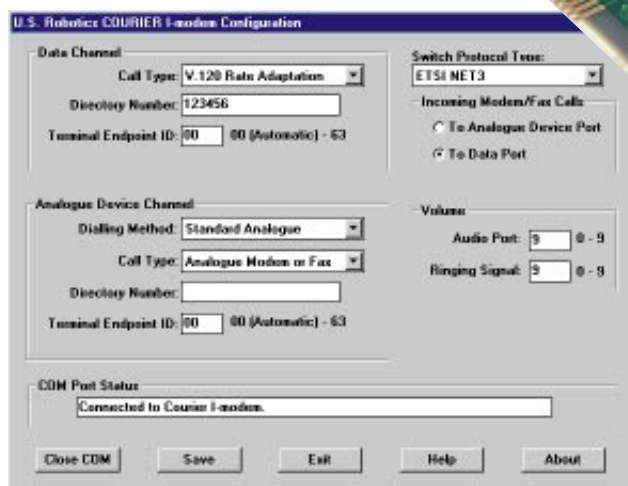
where the I-Modem can come into its own. If this is set to Automatic Service Choice it will first try to connect using V.120 rate adaptation (most commonly used for internet dial-up ISDN access). If this connection fails it will try V.110 adaptation, then it will revert to the analogue modem at V.34 and try to connect at whatever speed is possible in normal modem manner.

With USR's x2 technology support included, the I in I-Modem definitely stands for impressive. There was no support for ISDN channel bonding (so giving a single 128Kbps channel) in the model I reviewed, but it will be included by the time you read this.

Mark Baynes



Configuring the I-Modem: Note the switch type set to ETSI NET3 (Euro-ISDN)



manufacturers have yet to catch on to Win95.

answer is simple — buy both, in the shape of the USR Courier I-Modem which combines a V.34 modem and ISDN TA on one internal card.

The I-Modem is a full-length ISA card (an external version is also available) which has one jack for an ISDN line and one for a standard telephone line in its rear bracket. It also has a small red box containing four DIP switches, two of which are not used. The other two tell the card whether to ignore or act on AT commands and whether to load NVRAM settings, but normally these should not need to be touched.

The I-Modem comes with ISDN cable, a

The appropriate IRQ and Com port settings are configured via two banks of jumper switches at the bottom of the card which are very difficult to get at once the card is in place. If all goes well your system should auto-detect the card and all you have to do is install the Win95 drivers. This will result in Courier I-Modem with ISDN and V.34 PC PnP on Com3 being added to your list of available modems.

If your machine is not plug-and-play enabled, you first have to run the Comtest utility from the QuickLink II disc which can either suggest appropriate IRQ and Com port settings or test an already installed

PCW Details

Price £399 (internal and external models)

Contact US Robotics 01734 228200

Good Points Very keen price and almost completely future-proof.

Bad Points Documentation could be more user-friendly with better coverage of Win95 issues.

Conclusion With support for USR's x2 technology the I-Modem should cover all communications needs for the power user.

★★★★★

Hardware

Nikon CoolScan II

This dedicated film scanner is an acceptable budget solution.

Nikon's CoolScan II, aka LS-20E, is a dedicated 35mm film scanner. To scan film you need to shine a light through it, rather than reflect light off it. Flatbed scanners can do this with transparency adaptors, but the resolution is still 300 to 600dpi. This is fine for an image measuring up to A4, but 35mm film is only an inch by an inch and a half and even the largest pro film formats are smaller than your average print.

Enter the dedicated film scanner, which concentrates all its resolution onto a tiny area. The CoolScan II boasts a 2700dpi optical resolution, but remember, this is only across an inch width. Even so, at this highest setting, this results in scans up to 3888 x 2592 pixels, measuring 28.8Mb in size — perfect for large reproduction in print, or of course in electronic

publications at lower resolutions.

The CoolScan II previews in around 20 seconds and captures full-resolution images in a single pass in around 80 seconds. It easily resolved grey levels in our tests and boasted a smooth, wide colour range, only falling off in the darkest shadow end. This is mostly due to its 24-bit colour depth, which will keep all but the most fussy users happy. Nikon also does a quicker Super CoolScan 36-bit model for £1,795 (plus VAT).

Mounted slides are taken one at a time, or an unmounted strip of up to six frames may be used with a cunning reversible loader. Focusing is automatic and the excellent software TWAIN driver can reverse negative images; Photoshop LE is included.

The external CoolScan II measures 151



Cool customer: the CoolScan II

64 x 268mm, and an internal 5.25in version is available: both are SCSI-II devices requiring a SCSI interface.

Gordon Laing

PCW Details

Price £899 (plus VAT; RRP)

Contact Nikon 0800 230220

Good Points Budget 35mm film scanning.

Bad Points But not cheap, and that's all it does.

Conclusion Still the cheapest decent solution.

★★★★

Software

StoryCraft

Wasting blood, sweat and tears on that big-money boddice-ripper? Then try this for size.

StoryCraft describes itself as "The Ultimate Story-Generating Software". Decide on the type — Theme or Action — and the category — Adventure, Puzzle or Love Story — then create the story by following the stages.

Although I see a lot of mediocre software, it's a privilege to come across an application quite so appalling. It insists on being installed in your "C:\Program Files" folder. Stick it in another folder and the Uninstall won't work. Stick it on another drive and it won't run at all. And although designed for Windows 95, the manual advises "Don't start any other programs while StoryCraft is in operation".

Start StoryCraft and you're in the Visual



Heroes and villains are a staple of StoryCraft

Basic Interface from Hell. Three separate windows let you read the steps involved in each stage of story creation. To switch categories or move between steps, you use the horizontal scroll bar. Apart from launching WordPad and a "Journal" window

for taking notes, the program doesn't do anything except display texts. You can't even resize the windows to read more at one time. It could have been far better implemented as a Help file, or, dare I say it, a book. A shame, because there is some sound storytelling advice buried in here.

Tim Nott

PCW Details

Price \$99

Contact StoryCraft Corporation
001-757-855-3304 or www.exis.net/story

Good Points Some good writing advice lies buried within.

Bad Points An interface from hell that doesn't actually do anything.

Conclusion A collector's item of bad programming.

★

Software

Netscape Communicator

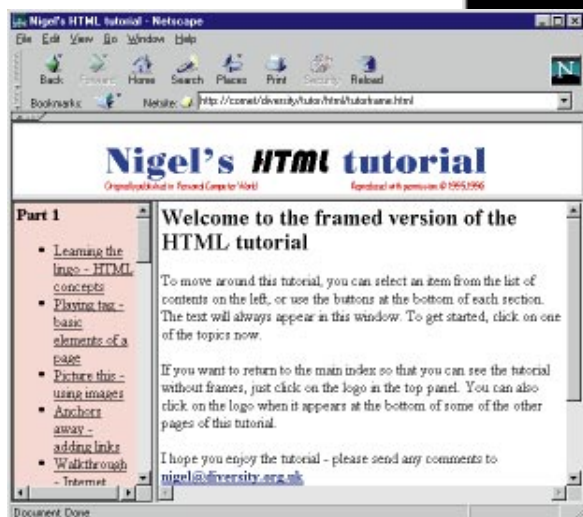
The preview version of this suite of applications promises a powerful, comprehensive net solution.

Netscape Communicator is a suite of applications, available in two editions. The Standard edition includes version 4.0 of NetScape's Navigator; Messenger, the email application; Collabra, for sharing information; Conference, for real-time conferencing over the net; and Composer, for creating messages and web pages.

The Professional version adds admin tools and access to IBM hosts. There's also



Above The new layers tag allows you to move different elements of your page between foreground and background



Left The new browser looks uncannily like Microsoft's Internet Explorer

scheduling via Netscape Calendar. The core of what many people will need for net access is there, and if you were to add a Java version of an office suite, like Corel's, then you really would have a completely internet-aware suite that did just about everything you needed.

We looked at the preview version of Communicator for Windows 95; it can be downloaded from the Netscape web site, and versions for Macintosh and Unix will be available later. (Since it's a preview, not all the features are there.) Installation places an icon on the desktop for Communicator; it actually launches Navigator and a floating toolbar, which gives instant access to the other parts of the suite. Oddly, the toolbar disappears when you quit, so it's back to the Start button if you want to get in again.

The main changes to the browser appear to be in the user interface which is now uncannily like that of Internet Explorer,

complete with buttons that only turn into buttons when the mouse moves over them, and bars to drag around to rearrange the various parts of the interface.

The main new feature in the preview we looked at is layers. Just as in a drawing program, you can tell the browser that certain pictures, or elements of the page, are behind or in front of others, and change the order of the layers with a script, to highlight particular parts or create animated effects.

Messenger may well be the thing many people use most, and it's a much better effort than the corresponding Microsoft tools. The address book in particular is well thought out, and allows you to type in a name and automatically search some of the main internet directories, even telling you in some cases which city people are in.

Mail can be retrieved through POP3 or IMAP, which some service providers now

offer and may be more useful on corporate LANs since it allows better central control. Composing messages, however, while very simple, hides a particularly irritating aspect of Messenger. Composer allows you to create "rich" messages, embedding pictures or different fonts, effectively hiding the fact that you're composing HTML. At

least that's less objectionable than the ms-tnef format Exchange uses. But when you send a message, it uses the MIME multipart/alternative type. People with a MIME mailer that doesn't understand HTML will see plain text, while people with one that does will see your scribbling in all its glory. People who don't have a MIME mail program will see first the text, followed by a separator, then the HTML, since both versions are included in the message, more than doubling its length. On the plus side there's comprehensive filtering, so you can separate out your mail into different folders automatically, and web pages are very straightforward to create.

It looks like Communicator is going to be a tremendously useful package for some people. If you want something that will let you create and view web pages, with a better than average email program thrown in, it's well worth taking a look at.

Nigel Whitfield

PCW Details

Price Preview versions are freely downloadable from <http://home.netscape.com/>

Contact NetScape 0181 564 5125

Good Points Easy-to-use, powerful email program. Much improved interface.

Bad Points Large. Odd format for email messages.

Conclusion On the basis of what we've seen so far, Communicator should be a powerful suite. It may be all you'll ever need on the net.

★★★★

Microsoft Visual Basic 5.0

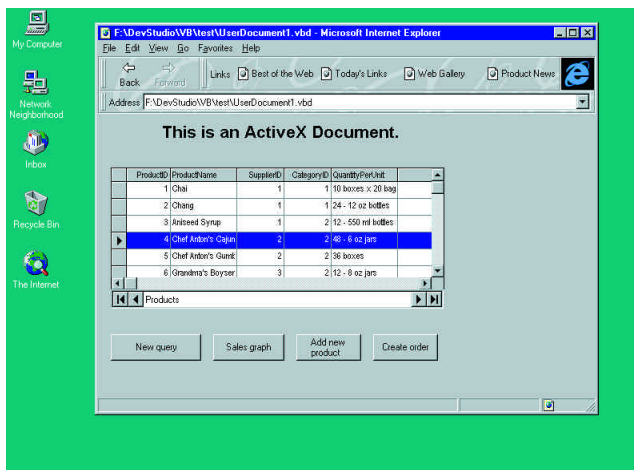
Performance and power have been sticking points with VB: has Microsoft remedied them here?

Version 5.0 is Visual Basic's biggest upgrade yet. It is just as well, since VB is under pressure despite its huge popularity. Performance is one problem, especially in large projects with complex forms. Power is another, with irritating limitations that force programmers to use other languages. Third, poor object orientation has made VB look dated. The new version addresses all these areas with varying levels of success, while pulling further ahead in the ActiveX arena. Stop here, though, if you are working with Windows 3.1: version 5.0 is 32-bit only.

The new Visual Basic looks more like Developer Studio, as used by Visual C++. It is not the same, and sadly lacks the integration of help and online books found there. VB's Books Online runs as a separate, slow application, at least in this beta version. The development environment uses docked windows to organise your desktop, which is good if you have a large display, with the old style available as an option. VB's toolbox is smarter, with right-click customisation and user-defined tabs for organising components. The code editor is improved, with pop-up syntax help and auto-complete of property and method names. You can now open more than one project, which is useful for ActiveX testing. There are new wizards, giving you a head start with most applications.

Performance has been tackled in two ways. Microsoft has speeded up the forms engine for a snappier feel and VB offers compilation to native code with several possible optimisations. Native code executables still need the VB runtime library. Brief tests show compiled routines running up to twice as quickly, while form loading and display is not greatly affected. Overall performance is better than in VB 4.0, whether compiled or not. Raw speed will no longer be a reason not to use Visual Basic.

Microsoft is careful to call VB object-based rather than object-orientated. It has class modules, code which defines custom objects, but you cannot create visual classes and non-visual classes do not support inheritance. In version 5.0, classes

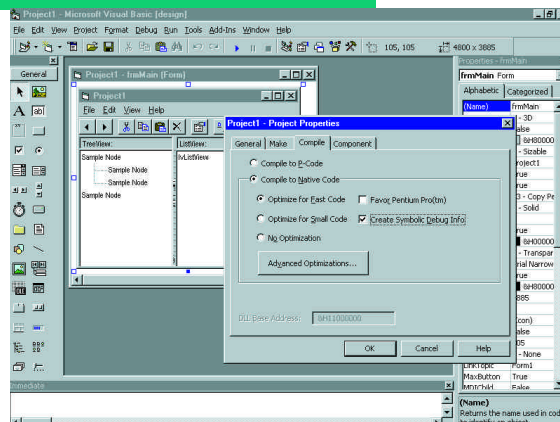


Left This VB application is running in Internet Explorer as an ActiveX Document. Just don't try it with Netscape

Below New in VB 5.0, native code compilation speeds code execution

are improved by a new Implements keyword which lets you add the interface of one class to another: for example, a Salesperson class might implement an Employee interface. Technically this is polymorphism but not inheritance, especially since all the methods of Employee have to be redefined by the SalesPerson class. You can get around this by creating an Employee object as a private member of the SalesPerson class. When you want a SalesPerson method to be implemented by Employee, you simply call the equivalent Employee method of this private object. This is called delegation and provides much of the power of inheritance, although by a more roundabout route.

VB 5.0 implements many ActiveX features. You can create ActiveX controls and install them in the VB toolbox, giving excellent code re-use. OLE DLLs, known as ActiveX code components, let you create function libraries shared between applications. New in VB 5.0 are ActiveX documents. These allow forms to be saved as documents with a .VBD extension which can be opened by any ActiveX document client, complete with all controls and menus. There are not many of these clients around, but Internet Explorer is one of them. You can host a VB application within



Internet Explorer by opening the ActiveX document, perhaps by clicking on a hyperlink. It is a great feature but the snag is that it won't work with other browsers.

VB 5.0 has limitations in ease of use. It is dependent on COM, which brings strengths and weaknesses. VB users will be well pleased, and Windows developers should take a close look.

Tim Anderson

PCW Details

Price Not yet announced

Contact Microsoft 0345 002000

Good Points Native code compilation, ActiveX controls and documents, improved VB components.

Bad Points COM can be unreliable. No inheritance. Still not the last word in power.

Conclusion A great improvement, superb for ActiveX work, and a good all-round tool.

★★★★ (Applies to beta only)

Software

Symantec Norton Utilities 2.0

This doctor is permanently on a home visit. The virus checker in particular is invaluable.

A new Norton Utilities is always something to look forward to, but competition in the utilities market has grown fierce with products like First Aid, Uninstaller and the must-have Powerdesk. Norton 2.0 enters the field with new weapons including built-in virus protection, online updating and a host of improved features to beat off the opposition.

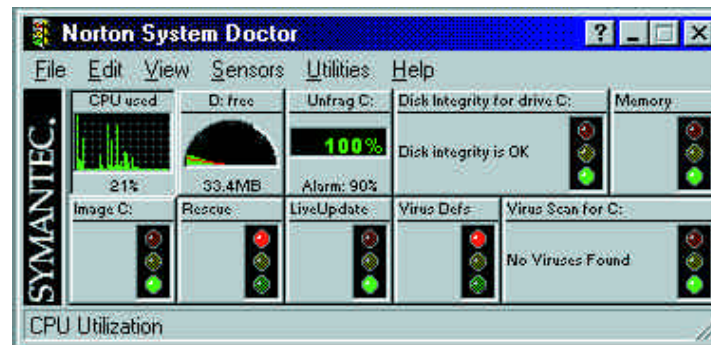
Perhaps the most significant new feature is LiveUpdate. It enables you to log on to the Norton site on the net and download program enhancements which handle problems that may have emerged since the

Norton Registry Tracker lets you monitor changes to your setup data and startup files, including the Registry and .INI files.

The last of the new features is Norton File Compare, a useful utility which compares the content of two versions of a file.

Norton Utilities 2.0 has been overhauled to take

saves information about your disks and is a key to tools like UnErase Wizard and DOS-based recovery utilities.



Above Norton System Doctor: at-a-glance track of your system's health

Left The Norton Genie helps you modify Windows

The Recovery suite has enhanced utilities like Speed Disk and Norton Disk Doctor, which has been updated for Windows 95. It includes compatibility for FAT32, the new disk format for large hard drives. You can let Auto Repair fix most disk problems for you.

Performance and Customisation includes the Norton File Compare and Norton Registry Editor. The Norton System Genie gives you tips, and control over the look and feel of Windows, how it starts and runs and how it handles files. The suite is completed by Space Wizard, a simple tool for identifying files which take up space and which you can delete, compress or move. Speed Disk is essentially a glorified defragmenter.

Norton 2.0 is worth having but it takes up a lot of hard disk real estate. Features like disk defragmentation already come with Windows 95, and there's a few tools you might never use. But it could be a life-saver.

Paul Begg

PCW Details

Price £69 (plus VAT)

Contact Symantec 01628 592222

Good Points A standard set of utilities which should find a home on most computers, and the built-in virus check makes it great value.

Bad Points Not much to set your spine tingling.

Conclusion Worth having.

★★★★



latest version of Norton was released, including new viruses. The difference between LiveUpdate and logging on to a manufacturer's support site and searching for new patches and updates is that Norton System Doctor does this job for you, with a sensor which lets you know when new updates have been added to the site.

Other new features are useful but won't get you too excited. Norton System Genie provides hand-holding guidance and step-by-step instructions for automating many Windows customisation and performance options. There are two new utilities to help you take control of the Windows Registry (the master record containing your system hardware, software, and network settings, among other things). Norton Registry Editor lets you edit the Windows Registry while

full advantage of Windows 95. The tools cover four categories: Prevention, Recovery, Performance and Customisation, and Information.

Norton System Doctor monitors everything about your system, from disk fragmentation to memory usage, from net access time to how well you are protected against viruses. You can customise the way System Doctor works, getting it to display advice or take corrective measures itself.

A useful — and possibly life-saving — utility is Norton Protection, an enhancement for the Recycle Bin which improves deleted file recovery using the Norton UnErase Wizard. You can recover files even when you have emptied the Recycle Bin. Other measures include a utility to create a Rescue Disk and a tool called Image which

Software

Symantec Act! 3.0

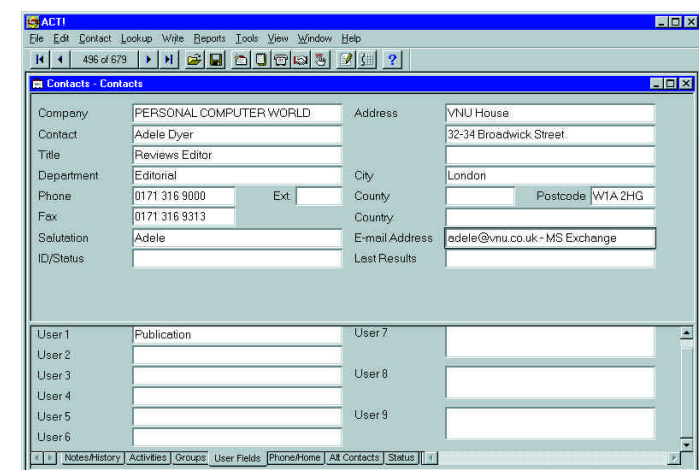
The curtain rises on the 32-bit Win95/NT version of this perennial contact manager favourite.

Symantec's popular contact manager has appeared in its latest incarnation, Act! 3.0, a 32-bit offering for Windows 95/NT. The contact manager field is less crowded now that PIMs have taken over the simpler functions for many potential users, elbowing the less well-equipped contact management software off the pitch. At its price, though, Act! might well expect to recover some of that ground by adding people-orientated professionals such as "small business owners, consultants, and executive recruiters" to its traditional customer base of sales professionals.

Contact managers are more than just a diary and an address list. They incorporate database functions too, with specially-written procedures to maintain your liaison with customers, vendors and prospects. In Act! 3.0 these facilities extend to synchronisation, customisation and the near-essential internet connectivity.

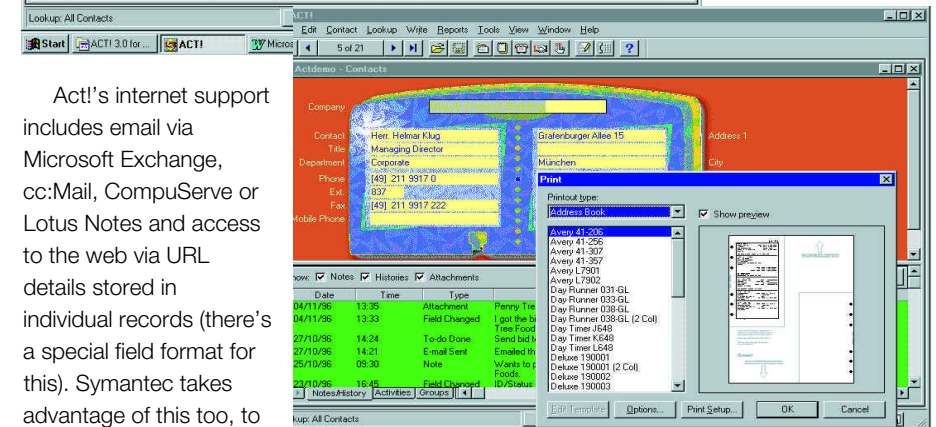
Synchronisation is mainly of interest to users who need to maintain more than one copy of their records, such as a sales team exchanging up-to-date information across several computers. It can also be used to synchronise information in different databases on the same machine. Act! simplifies both procedures with setup Wizards, which can include notes, histories, and activities as well as the basic contact information.

Customisation has been strong in all versions of Act!. Version 3.0 adds features like links to Microsoft Word and Word-Perfect (it also has a built-in word processor), the ability to attach letters and files to contacts' records, new contact form and list views, and the ability to redefine almost every field and to add new ones. You can specify which fields are indexed to help speed up lookups, queries, and sorts. You can display and edit all your contact information in a Contact List window, and you can decide which information appears in the list. You can open multiple Act! windows at one time, and you can drag and drop from one window to another as, for example, from the Contact window to the Calendar window.



Left As well as six different ways of viewing contact information, you can define your own

Below The printout option offered use mostly American paper sizes but does include A4



Act!'s internet support includes email via Microsoft Exchange, cc:Mail, CompuServe or Lotus Notes and access to the web via URL

details stored in individual records (there's a special field format for this). Symantec takes advantage of this too, to operate its LiveUpdate, whereby customers can get Act! 3.0 product information, patches and updates direct from Symantec via the internet. For faxing, you can use either Microsoft Fax or WinFax Pro. Other new features include TAPI (Telephony Applications Programming Interface) support with a complete telephony integration function letting users take advantage of Caller-ID (where available) and direct dialling from a contact record.

You can now choose from six ways of laying out your contact records, not including six more "details" tabs at the bottom of the window, with additional fields in which you can record and view contact and group information. You get eight buttons for jumping to different windows like your email or task list. You can't say you don't get enough information but you can say it's sometimes difficult to find, because there's no alphabetical tabbing or

quick search (unless you've predefined one). This makes Act! great for proactive sales and marketing but poor for reactive use where you might need to go quickly to a contact while, say, talking on the phone. Act! 3.0 for Windows requires Microsoft Windows 95 or Windows NT 3.51 or NT 4.0, an 80486 or higher microprocessor, 8Mb of RAM and 23Mb of hard disk space.

James Taylor

PCW Details

Price £189 (plus VAT)

Contact Symantec 01628 592222

Good Points Useful set of features. Capable of considerable customisation.

Bad Points Cumbersome to search.

Conclusion Nearly every feature you might want for contact record-keeping and analysis, but not easy or fast to use.

★★★★

Software

Borland C++ Builder

Speedy development makes this a productive tool, although Pascal still lurks under the surface.

Borland's Delphi proved that visual development, native code compilation and a high-powered language could exist in one package. Delphi's language is Object Pascal, a version of Pascal so extended by Borland that it is nearly proprietary. For some, the necessity of using Object Pascal was enough to rule out Delphi despite its attractions. C++ Builder is the result. It is so like Delphi you cannot tell which it is until you open the code window and see C++ declarations.

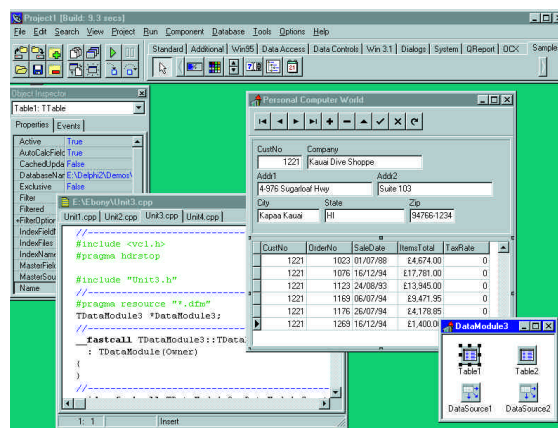
The class library in C++ Builder is the same one used in Delphi and is written in Pascal. The interface to these Pascal units is contained in special header files with a .HPP extension. Including these headers, you can call the visual component library (VCL) as if it were native C++. That means C++ Builder can compile both Pascal and

drivers for dBase, Paradox, and leading SQL server databases, and can also link to ODBC (Open DataBase Connectivity).

C++ Builder lets you switch easily from visual form design to writing code. In that way it is like Visual Basic or PowerSoft's Optima, and unlike Borland C++ 5.0 or

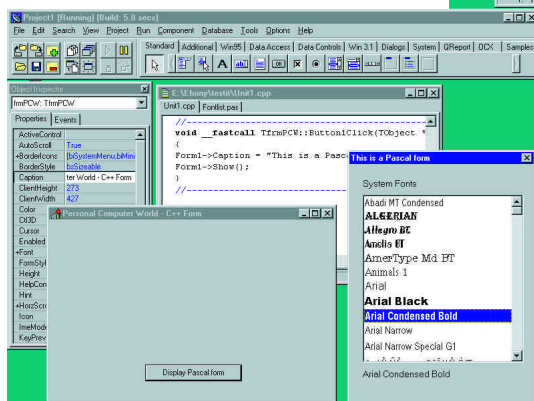
and C++, so calling the Windows API is easier than in other languages. Most important, more developers know C++ than know Pascal, making C++ Builder immediately accessible.

I do have some reservations about C++ Builder. First, I doubt that its users will be able to ignore Pascal completely. Working with the product in-depth will inevitably mean consulting the VCL source, most of which Borland generously supplies with the Professional and Client-Server versions, and the VCL is Pascal. Second, the VCL does not encapsulate Windows as completely as OWL (Object Windows Library) or MFC (Microsoft Foundation Classes), the C++ libraries which ship with Borland C++ and



Above C++ Builder lets you build database forms using database components and bound controls

Left Bizarre but true: C++ Builder will happily compile C++ and Pascal code in the same project



Microsoft Visual C++ respectively. You can write code to overcome individual problems, but some developers will prefer to stay with these richer class libraries although they are harder to use. Finally, C++ Builder cannot compete with Visual C++ in supporting new Windows features. For example, it supports ActiveX automation and can host ActiveX controls, but there is no easy way to create ActiveX controls or ActiveX documents.

Its obvious rival is Optima++, which I rate better for database connectivity but less good in every other respect. The VCL itself is proven and robust. For productivity, C++ developers will find it hard to beat.

Tim Anderson

C++ code, even when mixed in the same project. The editor detects the language used and adjusts its syntax highlighting.

What you get is a visual development environment that lets you drag and drop components from a toolbar onto a form. These components cover all the standard Windows controls, including the Windows 95 common controls like the tree view outliner and rich text edit box. A series of database components encapsulates the Borland Database Engine (BDE), including a Datasource object for defining a connection, and table, query, session, SQL (Structured Query Language) update and stored procedure objects which link to a Datasource. The BDE itself has native

Microsoft Visual C++ where visual elements are laid out in a separate resource editor. The compiler and linker work quickly to enable frequent test builds, but not as quickly as Delphi. Linking is incremental, saving time on the second and subsequent builds.

The combination of Delphi's visual development with standard C++ has several attractions. The language is more powerful than Pascal, although it is also harder to learn. There is far more existing C++ code around, much of which will migrate easily into C++ Builder which supports ANSI C++ including multiple inheritance, namespaces, the Standard Template Library and Run Time Type Identification. Windows itself is written in C

PCW Details

Price Learn to Program £39.95; Standard £69; Professional £399 (as upgrade £199 if you have Borland C++ or Delphi); Client/server £1,299; Scholar Edition (Professional) £95

Contact Borland 0800 454065

Good Points Fast visual development with standard C++.

Bad Points Pascal underneath.

Conclusion The most productive C++ tool.

★★★★ (Applies to beta only)

Software

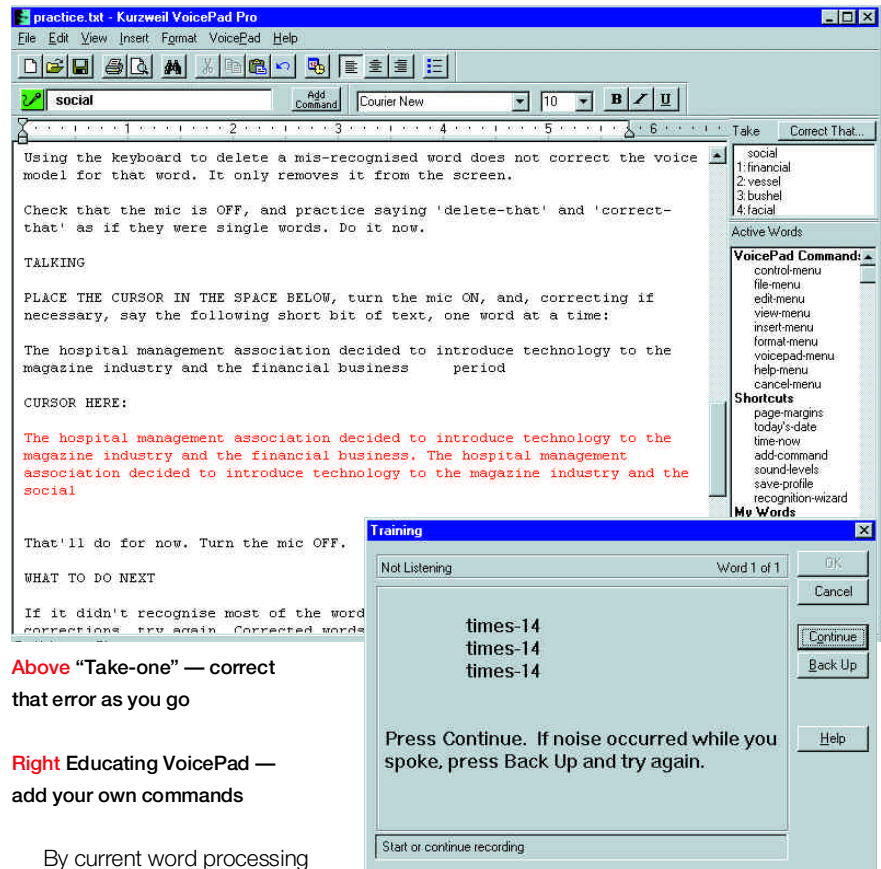
Kurzweil VoicePad Pro

If Qwerty gives you nightmares, this program adds a new dimension to talking in your sleep.

Unlike the company's flagship product, Kurzweil Voice, which offers system-wide voice recognition, this confines itself to word processing. In the box are a lightweight headset which clips against your left ear, and a CD-ROM. You'll need a minimum of a 486 DX/75 (Win3.1) or Pentium 75 (Win95), a 16-bit SoundBlaster-compatible card and a recommended 16Mb of RAM.

Start up and you first have to sign on as a user, with your gender and, if under 17, your age. You then perform a microphone level check and you're ready to go. The interface is a dead ringer for Windows WordPad, with a few specific additions. Below the standard toolbar is a button to turn the microphone off and on (you can also do this by saying "stop-listening" and "listen-to-me") and a window showing the last recognised word (or an error message). At the right of the screen is a scrolling window containing the 20,000-strong vocabulary of words and commands, and above that, the "Take" window. This is especially useful. If you say "sight" and this is interpreted as "site", you'll find "sight" as one of four alternatives here. Saying "take-one" chooses the first option, "take-two" the second and so on. If the word you said doesn't appear, saying "correct-that" opens a dialog box into which you can type the word — this reinforces VoicePro's learning process of your speaking style. If the word is wrong or you coughed halfway through, or just changed your mind, "delete-that" removes it. To dictate plain text you pause slightly between each word; to issue commands you run the words together, so "file" "menu" generates those words but "filemenu" makes the File menu drop.

After you've dictated 800 words or so, you're prompted to "enrol" — spending about 20 minutes dictating words and number strings from a prompt. After this, VoicePad spends a while (the manual says this could take several hours, but it took less than fifty minutes here) digesting this information to refine the profile of the user's voice. Each user has to do this, but unless you're under 17 it's a one-off task.



Above "Take-one" — correct that error as you go

Right Educating VoicePad — add your own commands

By current word processing standards the program is fairly limited, but it's enhanced by the ability to create your own commands by assigning keystrokes to a spoken phrase. This can be a menu command or a piece of text, so you could assign "Times-12" to the keystrokes required to set the font to 12 point Times New Roman or "my-address" to insert your name and address. This is also useful for overriding some of the US conventions, such as responding to "full-stop" as well as "period". There are also some "smart" features like capitalising sentences and, like WordPad, it will save files in Word, RTF or plain-text format.

I tested this on a 16Mb Pentium 100 with a SoundBlaster. Initially, recognition accuracy was nowhere near the "90 percent or higher out-of-the-box" suggested on the packaging. After enrolment, accuracy improved, but I still found it no faster than my usual 25 words-per-minute typing, despite experimentation with the volume and recognition settings.

Although you can "talk-ahead" (not wait for each word to appear before starting the next), it's more cumbersome to return to correct a word than to do so on the spot.

A further £79 buys you the Pro Plus add-on, with a better microphone (you can wear it over either ear and it's less sensitive to noisy environments) and a disk of extra predefined (and UK-orientated) commands.

Tim Nott

PCW Details

Price £79 (plus VAT). Add £79 (plus VAT) for the Pro Plus version

Contact Talking Technologies 0171 602 4107, talk@easynet.co.uk

Good Points Cheap voice recognition.

Bad Points Only offers word processing, and slow on the test machine.

Conclusion Needs patience and fast hardware, but could be invaluable to those who can't — or don't want to — use a keyboard.

★★★

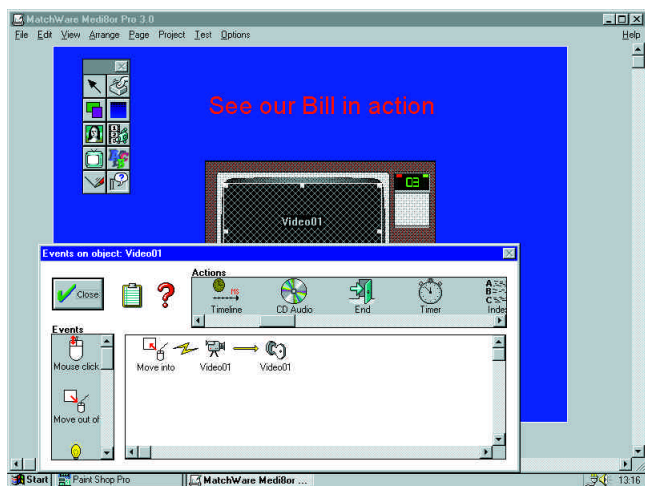
Software

Medi8or 3 Professional Edition

Everything you need to learn about creating multimedia applications, in one fun package.

There are few multimedia authoring tools on the market, most of them highly priced and many requiring you to learn a scripting language to use them effectively. Medi8or is a little different. It is not trying to be another Director, but is pitched alongside Digital Workshop's Illuminatus as a low-end, script-free tool. It is aimed at home users, the schools market — anyone who simply wants to put together a quick-and-dirty multimedia application.

The joy of Medi8or is that you can start to create an application as soon as you have completed the installation routine. There is a toolbar with the basic objects you can create including buttons, text, picture and video boxes. Each object can be drawn by simply dragging and dropping as in most drawing packages.



Events are quick to set up by dragging and dropping icons

Each of these objects can then have an "event" assigned to it. If you click on a button you can turn to another page or play a music track or a video clip. Text can even be turned into hypertext and an event assigned to it. Again, to do this you do not need a scripting language. To create an event you right-click on an object and drag and drop the options you want to occur, all listed as icons, into a box. So, for example,



if you want to play a video clip when the cursor moves over a box, you choose the icon for the mouse movement, an icon to search for a video and the "start" icon. Obviously the icons bring up their own dialog boxes, but again these are quickly negotiated.

Animations are easily created, by moving objects across the screen. You can control how quickly they move by a timing device built into the "events" window. You simply specify where you want the object to move and at what intervals.

There are a few other tools which expand its usefulness, such as

the Search facility which gives you the scope to create encyclopaedia-type applications. With tools such as an If-Then-Else action you can also create interactive demos and even tutorials.

The manual is helpful. There are a number of tutorials, talking you through the creation of a complete application, all explained in very visual terms. After a quick trawl through to discover what you can do

Applications can be put together immediately by choosing options from the icon bar

and how to do it, you will probably consign the manual to the bookcase. While creating your application, it can be tested as often as you want to make sure you are getting it right. The full application is not compiled as an executable until you have finished it.

One other feature is that you do not have to have Medi8or loaded on your machine to view the files. When Medi8or creates its applications, it creates them in a self-extracting file. The result is therefore wrapped up in its own viewer and, more than this, is able to adjust itself to the configuration of the user's display, including the resolution and the number of colours used. The application can then be viewed in a way as near as possible to the original.

Medi8or is not a sophisticated package; at times, some of the operations seem a little clunky. Remember to designate an event related to a hotspot when you set it up initially, or you have to go back, delete the useless hotspot and start all over again.

The results you produce will not be overly refined, and there is only limited clip-art and videos included in the package. But if you want to experiment and learn about creating multimedia applications, Medi8or is a very good starting point.

Adele Dyer

PCW Details

Price £149 (plus VAT). (Schools prices from Ablac 01626 332233)

Contact Matchware 0181 940 9700

Good Points Easy to learn.

Bad Points Not too refined.

Conclusion Great fun, and a good starting point for learning to create multimedia applications.

★★★★

OS Interactive Atlas of Great Britain

Find out what's where with this interactive atlas, and you can improve your map skills, too.

The Ordnance Survey Interactive Atlas of Great Britain is as much a learning tool as a reference work, and what a good one it is, too.

It's divided into three parts: GB data, maps, and European data. It is packed with all sorts of useful information. The GB data files give you access to information about the political make-up of Britain (UK and European Parliamentary seats as at April 1992), population, climate and physical landmarks. European data is searchable by country and gives statistics in the form of a comparison chart for almost everything, from adult literacy to urban population.

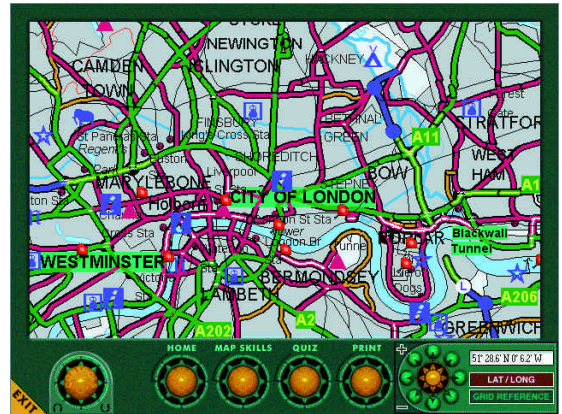
The maps section is the important one, though. It offers a wide range of mapping detail including full coverage of Great Britain at 1:625,000 scale (1cm to 6.25km) and 1:250,000 scale (1cm to 2.5km). Elements of these national mapping levels can be selected independently, enabling you to customise your own map screen display.

Maps and a learning tool in one

There is a gazetteer: just type in the name of the place you are looking for and the program will find it on the map. You can alter the scale; there's a handy reference to map legends and you can choose what to display. There is a useful glossary of terms and many photographs and videos.

The CD is a teaching program for adults and children. Click on a button called Map Skills and you are introduced to various topics with explanations, and there are tests to see how much you have learnt.

Overall, this is a nice package. I would have preferred it if the maps could have covered more detail than they do and it could run a bit faster.



Paul Begg

PCW Details

Price £39.95 (incl.VAT)

Contact Attica 01865 791346

Good Points Useful. Educational.

Bad Points A bit slow.

Conclusion A good learning tool with lots of information.

★★★

Raphael - An Artist for the Vatican

Walk into the Vatican's Stanza suite and appreciate Raphael's work without cricking your neck.

The Vatican is not just the centre of Catholicism — it is by far and away the world's best-stocked museum. Not only do works of art hang on its walls, but the walls themselves were frescoed by some of the great masters.

EMME Interactive has sole rights to produce CDs about the Vatican Museum and Raphael is sanctioned as an official product of the Vatican, one of a whole series EMME has so far produced — the apotheosis of Papal marketing. The influence of the Catholic church is apparent on the CD in so far as there are a few explanations of the bible scenes depicted and a little background into the theological disputes which were raging at the time that Raphael was working on the frescoes, but mostly the comment on this side of the art is kept to a minimum.

The CD is structured as a walk-through of the suite of rooms known as the Stanza.



Spin around the room to view Raphael's frescoes

In each room you can twirl around and look at the rooms in one full sweep, and look up at the ceiling, too. From any point you can zoom in on a fresco that catches your eye. On each fresco there is a brief description of its most important features and you get the low-down on who are the various characters, from saints to Popes.

Unfortunately there is very little

information on the style of the paintings. Nor could I not find any explanation of how frescoes are applied to a wall. However, there is a long section on the history of the time, in and around Rome, and an in-depth biography of Raphael himself.

The disk is relatively well structured, although some of the drop-down menus annoyingly stay on the screen once you have made your choice, blocking your view of the information beneath.

Adele Dyer

PCW Details

Price £39.99 (incl. VAT)

Contact Koch Multimedia 01420 541880

Good Points Looks good.

Bad Points Some details could be better.

Conclusion Interesting but not gripping.

★★★

Language learning packages

Three CD-ROM titles to assist budding linguists of all ages in learning the lingo of the land.

Research based on this year's league tables shows that of the 15 main GCSE subjects taken, pupils rated German and French the two most difficult. Despairing pupils, past and present, left struggling by classroom techniques, can try modern language programs using the latest speech-recognition technology, or they can help the next generation with a program for primary school-age children.

Learn to Speak Series

Learn to Speak is the most comprehensive title from the range of programs published by the Learning Company. It is based on 30 chapters, each of which follows an extensive pattern of listening, looking, recording and applying your knowledge in tests. Lessons begin with a set of vocabulary which you learn through recorded repetition, listening to words spoken in context and memorising them with the help of accompanying illustration. Having mastered the vocabulary, you move on to recorded conversations. Finally, there are screen-based exercises. Here, you mix and match, fill in the gaps and sort out word jumbles to reinforce what you have learnt, and points of grammar are introduced.

The program screen is well used as a tutor; up to nine on-screen sections help with everything, from grammatical notes and video talking heads, to the ubiquitous translation for those who just do not understand. The program comes with a text book for practice away from the computer, although the lack of pictures in the book makes a nonsense of exercises requiring an accompanying on-screen illustration.

Notes of caution in an otherwise ample program include having to install keyboard drivers in order to type characters with accents, and the fact that you spend much of the program playing the part of a visiting American in Paris for whom France remains a distant, and certainly foreign, country.



Q Steps French for Kids

German and French often seem difficult or out of reach to GCSE students because most will only have begun their studies at the age of eleven. If you want your child to learn from a much younger age, Q Steps French for Kids is the program for you.

Q Steps can start even pre-school age children learning numbers, colours and basic vocabulary. Games to teach numbers include clicking the correct digits on a telephone to make it ring. Point-and-click picture puzzles teach colours. Dressing-up games teach useful vocabulary. The graphics are stylish and some games include a tape recorder which has working buttons so that children can record themselves. This is one program where children happily resist the *c'est tout, maintenant* button.

Debbie Davies



Above Getting around in Learn to Speak

Below A talking parrot helps you learn to Think and Talk

Think & Talk series

For basic conversation, the Learning Company's Think & Talk series uses the Berlitz learning method, which is immersion in the new language.

The program has 50 short lessons which require you to listen, repeat and answer questions — in fact, you spend most of your time listening and repeating, which begs the question, why not use an audio tape instead? There are pictures which accompany the spoken text, but the crude style of these, a criticism which also applies to the screen design, is not particularly pleasing on the eye.

Functions which begin to use the computer's capabilities include a 10,000-word easy-to-search dictionary, but the exercises such as filling in a missing word or translating lists of words may as well be in a handy notebook which you could carry around with you.

The program's strong point is its speech recognition technology. Your recordings are graded by an on-screen gauge which moves from tourist to native depending on how closely you matched the program's tutor. This provides a real incentive to practice your accent.

PCW Details

Learn to Speak Series

(French, German, Japanese, Spanish)

Price £99.99 (incl. VAT)

Contact The Learning Company (formerly Softkey International) 0181 246 4000

Good Points Given time and effort, provides a thorough grounding.

Bad Points American approach. An inferior solution for typing accented words.

Conclusion Those who can afford to should do better.

★★★

Think & Talk Series

(French, German, Italian, Spanish)

Price £79.99 (incl. VAT)

Contact The Learning Company 0181 246 8000

Good Points Best use of speech recognition technology.

Bad Points Not much to choose between this and an audio tape.

Conclusion Are you paying for the name?

★★

Q Steps French for Kids

Price £24.99 (incl. VAT)

Contact MacMillan Interactive Publishing 0171 881 8301

Good Points Learn by playing interactive games.

Bad Points Content is thin.

Conclusion Just what kids need.

★★★★

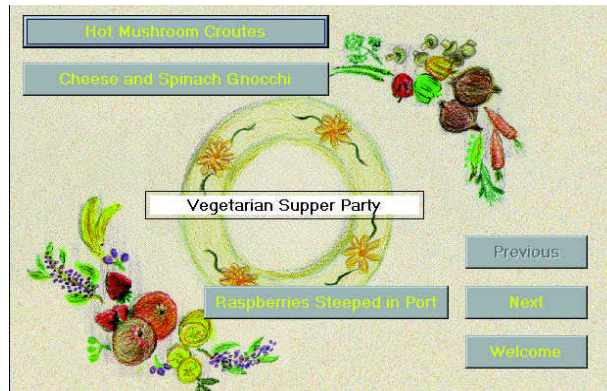
Recipe for success

A "heygoodlookin'... whatyougotcookin'?... how'saboutcooking somethingupforme" CD.

VCI's Recipe for Success is subtitled "the recipe program the professionals use". Professional what? Professional dentists, professional rugby players or professional chefs? One assumes they mean the latter, but it does beg the question.

That aside, Recipe for Success is one of the best cookery CD-ROMs we have seen to date. Not that it has a wealth of fancy graphics, nor is it jam-packed (*sorry!*) with photographs and videos (on the contrary, there is not a single one), but rather that it is a good database of recipes which can be added to and modified as you wish.

The recipes held on the disc are of an excellent standard. It is the kind of collection where you actually want to go straight into the kitchen and get busy. You can find what you are looking for by recipe (choose ingredient, type of cuisine, difficulty level or calorie count), or by menu. There are over 2,000 recipes and menu suggestions, many of them for vegetarians.



Great menus for a gourmet feast

The most useful aspect of this CD is that you can change the recipes and add your own. Since many cooks will automatically change recipes to suit their own taste, this aspect is particularly welcome. If you do add your own recipes, they are stored in the database and will appear in the results of any relevant search. It is a great way to collect recipes and render them searchable, especially those you don't use very often.

Updates will be available and there is a

wizard in the program with which to add them, and there is a routine for backing up the entire store of recipes. For once, this is a CD-ROM you will want to keep hold of.

Adele Dyer

PCW Details

Price £19.99

Contact VCI 0181 998 1517

Good Points You can modify the database.

Bad Points No multimedia to speak of.

Conclusion A great collection of recipes.

★★★★

ADC Technology Training

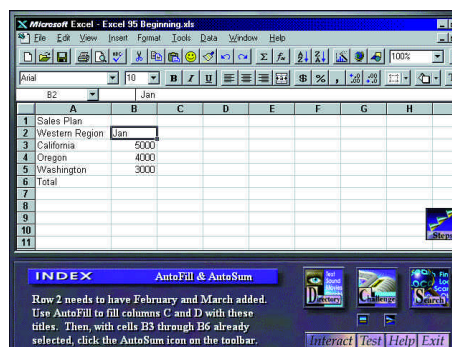
Excel and Word training packages for companies wanting a cheaper alternative to IT training.

Excel and Word are two of the most common applications.

These tutorials won't make you a whizz at using the programs though; they are more basic than that.

The underlying concept is sound enough. Students are allowed to learn in their own time and each training program lasts 5-8 hours. On-screen tutors guide you through the lessons, and a test mode helps you practice what you've learnt. An Interact function allows users to jump between the real application and the CD.

ADC appears to be aiming at companies wanting a cheaper alternative to IT training. The software is simple and utilitarian, and no money has been spent on anything that would make learning remotely interesting. Although the tutorials plod along, they are thorough and users should be proficient in the software by the end of the course.



Learn how to format cells in Excel 7

Each is comprised of three modules: beginner, intermediate and advanced. The LearnKey Beginning tutorial for Microsoft Excel 7 is aimed at the novice. It is assumed that you know nothing about Windows and have never used a word processor. The LearnKey Intermediate tutorial for Microsoft Word 7 isn't much different. For those who

have no idea how to format a border or do a spellcheck, this will get you started.

Both on-screen tutors are American and friendly enough but they have voices that are soft and calming and it is easy to drift off. The video movies are a nice but not very useful addition. The tutors do little more than talk to you from behind a middle management desk in a corporate American office.

Lynley Oram

PCW Details

Price £199 each; £579 for three (incl.VAT)

Contact ADC Technology Training 0181 429 2410

Good Points Easy to use.

Bad Points Lacks any features to help hold students' attention.

Conclusion Basic, straightforward teaching programs.

★★★

The Pink Panther's Passport to Peril

Children and adults alike will be tickled pink by this charming and informative learning game.

He's pink, he's cool — and he's in danger! "Is that dangerous danger?" he asks the inspector before setting off to Camp Chilly Wa Wa. This is a summer camp for rather special children from all over the world. But things (aah, you guessed!) are not quite what they seem, and our hero embarks on a global voyage where he unravels clues and finally confronts (aah, you guessed again) the baddies.



The Pink Panther gets busy on his round-the-world adventure

The gameplay is the usual adventure format. Click on things, pick them up, go places, trade objects, solve puzzles, but there's a strong emphasis on relating to other characters (this panther talks) rather than just objects. The puzzles, although challenging enough to last many hours, aren't too difficult, and you can't be sent back to the start so young players shouldn't get frustrated.

What's especially well done is that as Pink travels the world, you learn about it. Pick up a smattering of Mandarin or Cockney rhyming-slang. Find out about mummification or how Egyptian farmers irrigate. Learn about the Indian caste system — in song. It's all done in such a gentle, good-humoured way that you hardly realise you're learning. Although it doesn't

shirk social issues, it's never polemical and never gets in the way of the game. If you want to find out more, the PDA (Pink Digital Assistant) provides much more information on the geography, history and culture of the places visited. Above all, it's very funny, and although accessible to all ages there are a few jokes that only grown-ups will pick up, making it genuine "family entertainment". My only disappointment was that Henry Mancini's famous theme tune isn't featured, although it is included on an audio CD available separately.

Tim Nott

PCW Details

Price £29.99 (incl. VAT)
Contact Anglia Multimedia 01603 615151
Good Points Challenging, informative and very funny.
Bad Points No ba-doom ba-doom...
Conclusion It's a game, it's edutainment and... oh, just BUY it.
 ★★★★★

Elmo's PreSchool

He's cute, he's keen, and he has lots of activities to encourage kiddies to enjoy learning.

This game is aimed at the Sesame Street crowd, pre-schoolers still trying to get to grips with the concepts of shapes, numbers and letters.

Elmo is a popular Sesame Street character. So popular, in fact, that shops in the US sold out of Elmo dolls in the run-up to Christmas. He's furry and cute, and children will probably respond well to his enthusiastic and encouraging manner. Everything they do will be cheered, if correct. If they give the wrong response, Elmo will happily give them a blatant clue, encouraging them to have a second go.

He has a cutesy voice and habitually refers to himself in the third person — just the sort of thing that will eventually drive any normal adult up the wall. The game won't be much fun for the kiddies without sound, so either grit your teeth or let your child loose on the PC unsupervised.



Good graphics, with strong colours and well-defined shapes, are a highlight of this CD

Activities are fun and you'll enjoy doing them with your child, at least for the first time. A little hand can be moved around the screen, like a cursor, and objects that can be activated will sparkle. Clicking on a door will get you into an activity. Each activity contains two games and has various objects for kiddies to play with. Give Elmo his teddy

bear and they both perform an amusing hula dance. Give him a flower and he'll praise its scent and declare you a wonderful friend for giving him something so lovely.

Children are rewarded with playful graphics when they solve a puzzle, such as pigs popping out of boxes or musical mice. The game has been repackaged for the UK market and uses anglicised spelling.

Lynley Oram

PCW Details

Price £29.99 (incl. VAT)
Contact Creative Wonders 01753 549442
Good Points Fun graphics.
Bad Points Elmo's cutesy narration.
Conclusion Classic Sesame Street that should hold a child's attention.
 ★★★★★

Virgil Reality

Life, the universe and everything. That's Virgil's specialist subject, and he's here to share it with you.

This CD has many sections. One is the Activity Centre, full of different experiments you can do using the computer. Virgil Reality, a scientist who wants to teach you everything he knows, shows you how to do it and then you can print out your own fact sheet and do it yourself. Experiments range from making a sundial and your own toothpaste to copper plating and cleaning pennies. I tried the invisible ink experiment.

Virgil also has lots of information on the cretaceous and jurassic periods, providing facts about the dinosaurs and explanations for extinction. There is the Microscope section that lets you build your own microscope and view slides of bacteria and



Virgil's world is full of fascinating and fun things to learn about

plant molecules, and in the Space section you can learn not only about John Glenn, Yuri Gagarin and Neil Armstrong but also planets, comets, satellites and rockets. This part is accompanied by video clips.

Virgil makes learning about the universe fun. He sings songs like the "Everything's Connected Song" which points out that

everything on and off the earth is connected to something else. What I especially like is how this CD encourages children to do activities away from the computer, like the section where you can make your own greeting cards, colour in and put together bits of Virgil and his friends, and print off Virgil's Digestion game. This teaches children about the digestive system.

Virgil is clearly spoken, there are subtitles, and when the cursor touches an object the name of it is spoken, which could make things easier for children who are deaf or partially sighted.

Etelka Clark

PCW Details

Price £29.99 (incl. VAT)
Contact 7th Level 01932 355666
Good Points Everything a child needs to know.
Bad Points None that I can think of.
Conclusion Truly fab. Virgil, you're so cool!
 ★★★★★

Alphabet Soup

The abc of learning starts here: tutorials accompanied by games as a reward for success.

The main part of Alphabet Soup is based around tutorials and games on the various letters, but you have to complete the tutorial before you can move on to the games. You click on any letter of the alphabet and it is spoken aloud while it is written in chalk on the blackboard. You then get to play the games.

All the games look different for each of the letters but they all follow the same basic pattern — click on the word that starts with the relevant letter and a little animation is shown. Each letter has a different animation to go with it: "W", for example, has a cartoon featuring a witch,



Alphabet Soup's emphasis is on the sound and shape of letters

and if you click on the word "wizard", a wizard comes to visit the witch. Not sophisticated, but fun. There is a separate game where you have to click on each letter as it is spoken; the one drawback being that

the letters are not called by their usual names but rather, by the way they sound. Opinions change almost weekly on whether this is right or not, but there is no way of changing the way the letters are read out if you are trying to teach your children to call the letter by their correct names.

For teachers there is a section with workbooks for each letter, which can be printed out and completed on paper.

Adele Dyer

PCW Details

Price £29.99 (incl. VAT)
Contact VCI Software 0171 470 6666
Good Points Fun games, but educational.
Bad Points Unsophisticated.
Conclusion Good, but basic.
 ★★★

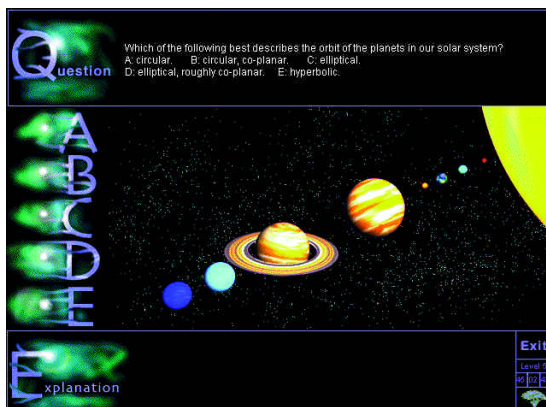
Acacia **Revise Series**

Stop fretting over those old exercise books and start some serious revising with these CD tests.

How did students cope with revising before the invention of CD-ROMs? In my day, we made do with exam questions from previous years, and tossed questions back and forth with our mates. These CDs are a lot more fun, and much more comprehensive. The three reviewed here cover GCSE chemistry, physics and biology and are available for both PC and Mac. Installation is almost as easy as opening a book, and a couple of steps will take students to the main menu.

Everything the CD has to offer is accessible from this menu. Buttons punch in as if they have a rubber cover and make a really satisfying noise to match. Clicking on the help button will run you through every function available. There's not much to master, so you won't need to access this more than once.

The setup is simple. Click on test,



Nice graphics complement these question-and-answer sessions

choose the section you want to cover and the number of questions you want to be tested on. All the questions are multichoice and offer five potential answers. Other options allow students to chart their progress and select the syllabus they wish to revise.

The questions have been made as interesting as possible given the subject matter. Letters for each question choice have been rendered with some rather

groovy graphics (see screenshot, left).

Other graphics, accompanying the questions, have also been well-designed. They add to the explanation, given when the correct answer is chosen. These tests may help students learn, rather than encourage them to just regurgitate information.

It's been some time since I took anything like a GCSE exam, but I was pleased with at least two of my scores here. A respectable 80 percent for Physics and 75 percent for Biology. I'd rather not reveal how I did in Chemistry (but if you must know, it was a bottom-of-the-class 25 percent).

Lynley Oram

PCW Details

Price £19.99 each/£50 for the series

Contact Acacia 01730 268463

Good Points Useful tool for revising.

Bad Points Can get repetitive.

Conclusion The ideal thing to help take the stress out of exams.

★★★★

The Funday Times - **Tooning**

Helping Billy the animator finish his movie might prove a little too taxing for very young minds.

The box reads "Suitable for ages 5 and up". I only wish I could have been that intelligent when I was that young. Come to think of it, it's a bit worrying that I can't even understand it now.

Tooning is a creative package, for kids to try and make their own movies. The story goes that Billy, an animator, has just one day left to complete a movie. The movie is due to be premiered the following day, but he falls asleep at his desk and forgets about it. It's down to you and the characters to finish it off for him.

Your task is to search the many studios to find the missing props and fit them into the appropriate scenes. On your way you have to solve puzzles to gain the objects you need. I stayed on level one and found it



Solving puzzles is all part of the junior movie-maker's day

surprisingly difficult: no straightforward instructions come with the game and this makes it hard to play. Walking around the rather plush studios and admiring the many expensive ornaments was good fun, though. It wasn't part of the game, but was nevertheless the best bit.

But it's not all bad. It will certainly keep your kids out of trouble for a while as they can play on it for hours, and it could be the beginning for any youngster who likes cartoons and yearns to be an animator. But prepare to face the consequences when they eventually get frustrated.

I would recommend Tooning to children around the age of ten, or any five-year-olds with a high intellect!

Etelka Clark

PCW Details

Price £29.99 (incl. VAT)

Contact News Multimedia 01525 852813

Good Points Needs lots of brain power.

Bad Points Frustrating.

Conclusion What IQ does your five-year-old have?

★

Long Term Tests

Software

Virtual Access

This fully-featured OLR will keep track of all the information within a common message base.

Virtual Access is an offline reader which can remotely log on to your favourite service(s) and trawl news groups, conferences or forums for mail and messages according to pre-set criteria. It will download new data and upload replies, all more quickly than you can type and working to pre-configured scripts. This adds up to financial savings in both telephone bills and access charges.

Virtual Access (VA) is the only OLR I know that can be configured to collect from different service providers and keep track of all the information within a common message base. Scripts are provided for CompuServe, CIX, internet news groups and other online services. There is no provision for AOL as its message base does not support threading. (Threading is where messages sent in reply to a topic or other messages can be referenced back to the original.) VA provides the user with a visual representation of the thread structure and highlights new subject thread starts.

Sending or replying to messages and mail is done using a screen button — “Compose” for a new message or “Reply” to append a message to an existing thread. This brings up the editor window where you can write your words of wisdom at your leisure. You can then instruct VA to dial up your service provider, post the mail, collect new mail and release the phone line. VA then performs what it calls an import function, where all the incoming data is filed in the correct places within your message base.

Incoming mail can be sorted according to Mail Rules allowing a filtering out of unwanted “noise” and grouping of information from different sources. A scheduler is provided to perform connects automatically so that you can set that big download to happen at 3.00am when the

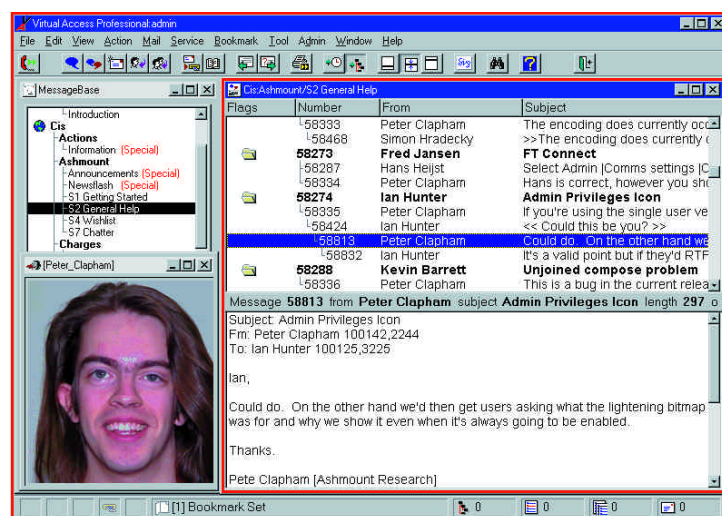
You can follow message threads and include your own photo to add that personal touch

telephone rates are low and the line can be expected to be clear.

The screenshot above shows the main VA window with message threads and headers. Below that is the text of the current message. One of the features of VA is the option to display a portrait of the author of the current message, assuming you have downloaded their picture first. It's fun and makes the reading of messages much more personal.

Apart from the mail and message handling VA comes with scripts for doing many extra jobs within CompuServe or CIX including file library searches and uploading and downloading. You can collect weather maps, stock market quotes and price history from the London Stock Exchange, access Microsoft support, or even check the good pub guide for your area!

VA is powerful and fully-featured, and it is this wealth of features which sometimes makes it difficult to find the required function within the array of menus, right-hand mouse buttons and double-clicks: for example, to disable mail collection on CompuServe takes seven actions.



There is a comprehensive help system and on installation VA loads a message base which forms an excellent tutorial. Online support within the Ashmount forum is exceptional: not only do Ashmount staff seem to work all night, but the users are friendly and helpful too. The user guide is well-written and presented as a large-format 340-page paperback.

VA is available as a 16- or 32-bit application for Windows 3.x, 95 or NT. A 30-day evaluation version is available if you want to try it for free.

Paul Drawmer

PCW Details

Price £54.95 (plus VAT)

Contact Ashmount Research 0171 831 4000

Good Points Fast, fully-featured OLR with multiple service ability and excellent support.

Bad Points Some features can be difficult to find at first.

Conclusion Professionally-written software that is an essential tool in my office.

★★★★

Software

CorelDraw 3

A program so full of drawing options and good value, it's a feast for the eyes and the pocket.

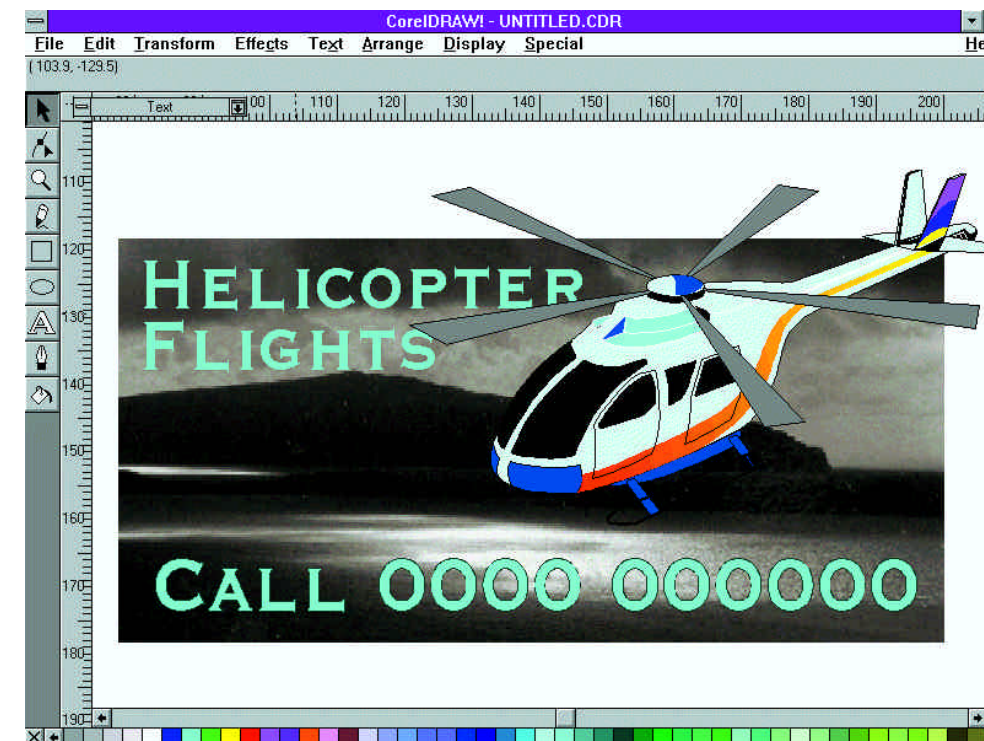
I've been a staunch supporter and user of CorelDraw products for many years, and having progressed through versions 2, 3, 4 and 5 (not in that order!) I have decided that pound for pound, CorelDraw 3 is by far the best. Version 2 is too basic, 4 is too buggy and far too slow, and 5 is great but more suited to serious specialist use. Version 3 continues to come down in price and currently, at around £35 (incl. VAT), must represent one of the best value-for-money programs you can buy.

The third incarnation of the Corel suite came on one CD bundled with PhotoPaint, an image editor full of artistic intentions but clumsy (I prefer Photoshop or PaintShop Pro), CorelTrace, a bitmap-to-vector tracing utility, the CorelMosaic graphics browser, and CorelChart and CorelShow. Also in the box are a comprehensive user manual and a colour clip-art catalogue which is very strangely indexed.

A year ago 625 fonts was a hell of a lot — in fact, it still is now. The typefaces are of a good quality. They're clones of original foundries, with similar names, which is okay for local printing but no good when you want to export data to an output bureau. TrueType and Adobe Type 1 fonts are supplied as standard.

Clip-art was relatively new then, and with 14,000 editable vector images on the CD you'd think you'd never be stuck for artwork. Unfortunately, most of it is typically North American or peculiarly specialised. There are too many medical illustrations, flags and military insignia, but two categories conspicuous by their absence are Christmas and furniture.

One of my pet hates about the drawing function is that the line thickness is always measured from the centre of the line. This means that when you're drawing a box



Flight of fancy: Features such as Fill, Skew and Roll help keep CorelDraw 3 on an upward curve

which is 90mm by 90mm with a 2mm border, you have to draw the box 88mm so that the line thickness (1mm on the outside of both upright lines) takes up the rest of the space. Not so good if you want to try a border of a different thickness later on.

Despite that, there are so many drawing options in this package it's unbelievable: rounded corners, gradient fill, radiant fill, skew, rotate, border behind fill, and border scale with size. With advanced features like roll-ups and layers, the program is easy to master and powerful, and most tasks require very few mouse or key movements to complete.

Talking of key movements, if you're a regular user of more up-to-date programs CorelDraw with catch you out, because Ctrl-C, Ctrl-V won't copy and paste. You have to use the old Ctrl-Ins, Shift-Ins instead. Ctrl-Z, everybody's favourite two-fingered shortcut, won't get you anywhere either — Alt-Backspace does the business but needs two hands, unless you have a nine-inch handspan!

CMYK colour separation is supported if

you're using a PostScript printer, but trapping, the overlapping of colours to stop white showing through, needs concentration and sometimes manual attention.

What makes CorelDraw such good value is that there's so much in it. CorelDraw packages, all versions, are so modular that you can just pick the programs you need or want. I've got Draw, Trace and Mosaic installed and I'm quite happy. It has one of the most controllable installers I've ever seen.

Marc Hindley

PCW Details

Price Product discontinued by Corel but still available from some dealers. Full 32-bit version 7 now available from Corel.

Contact Corel 0800 581028

Good Points Diverse and sophisticated design components. Great price.

Bad Points Clip-art a bit too North American.

Conclusion A robust, versatile design tool that doesn't disappoint.

★★★★

■ Hardware

Viglen Genie 120PC

It has stood the test of time — and an avalanche of software.

I've been using Viglen PCs for the last three years. My 486DX2 66MHz with 8Mb of RAM seemed fine at the time running Windows 3.11. Nevertheless, at the end of 1995, the move up to a more speedy Pentium 120MHz with 16Mb of RAM and a 1Gb hard disk was very welcome.

It seemed extremely fast and state-of-the-art when it first arrived, but over the last year or so it's become choked with software. In part that's my bad habit of running too many applications simultaneously, but it's also to do with the way apps like Office 95 have ballooned. That's why we now recommend 32Mb of RAM for PCs. The extra 16Mb is well worth the hundred quid or so it's likely to cost.

But deteriorating performance is not a criticism of the Viglen itself which has stood up admirably to everything I've thrown at it. My main bugbear has been fan noise from the power supply. For some reason this is

loudest first thing in the morning, but by mid-morning it's usually piped down to acceptable levels.

When new (we originally reviewed this machine in January '96) it cost £2,704; even then, that was on the pricey side. What you got for your money was a mini-tower case containing a PCI motherboard, a 1Gb hard disk, 16Mb of RAM and the then fairly new SoundBlaster AWE-32 wavetable sound card. At the time, the Teac six-speed CD-ROM drive was brand new although they're ten-a-penny now.

The insides are tidily arranged but beyond fitting a network card I haven't done much delving around inside. If I was hanging onto the machine for much longer I'd upgrade the memory; to do that I'd have to take the hard disk out, but that's a 20-minute job at most. The 15in Viglen-badged monitor has stood up well over time, as has the keyboard.

When friends ask me to recommend



a PC

I often mention Viglen. My time with the Ultimate Multimedia 120PC has done nothing to change my mind.

Ben Tisdall

PCW Details

Viglen Genie Ultimate Multimedia 120PC

Price £2,704 then, around £1,200 now

Contact Viglen 0181 758 7000

Good Points Solid, well-built, reliable.

Bad Points Noisy fan.

Conclusion Keeps chugging away, but now I'm ready for a P200.

★★★★

■ Hardware

PC-Trac trackball

An acquired taste, maybe, but a triumph in the right hand(s).

Ten years ago I ordered a large-diameter trackball from a company called Electrone. It cost £36 and for ten years it has done sterling service. Two years ago I upgraded to a Gateway 2000 Pentium 75 and, to my disappointment, it used a bus mouse: my attempts to add my beloved (serial) trackball met with failure. But I passed my old 386 on to my daughter and it still has the original trackball, so when she comes home from university I venture into her room and use her computer and trackball. Although her PC is much slower than my Gateway, the trackball is still a delight to use.

This year I bought a new one but the price is now a whacking £112 including VAT and delivery! It's slightly different from its ten-year-old relative, a bit sleeker and more

streamlined, and it feels a little less sturdy. Nevertheless, it is sufficiently similar to my old trackball to make me happy.

The new PC-Trac, like the old one, is a large device. The ball is 5cm in diameter and sits in a case 10cm wide and 18cm long. Two large buttons sit on either side of the trackball and replicate the left and right mouse buttons, and there's a third, smaller button on the top of the unit. The ball is operated with the middle fingers, as opposed to using the thumb.

The software that comes with PC-Trac emulates many of the functions of the Microsoft mouse driver plus a number of additional functions using combinations of button presses and the Alt and Ctrl keys.

The trackball is an acquired taste, and this large-diameter unit allows much more



10 YEAR
TEST

control than its tiny cousins. Small, precise movement can be done relatively easily.

Judah Arotzky

PCW Details

Price £89 (plus VAT)

Contact Electrone 01494 511999

Good Points Durable and doesn't take up much desk space.

Bad Points The newer model appears less durable.

Conclusion Outstanding value and a long life have made this device a sentimental favourite.

★★★★

Adventures in video

How to be a movie director in the comfort of your own home: you need a PC and a video capture card, and a budget production could be yours. Panicos Georghiadis and Gabriel Jacobs show you how to say "Cut!" in all the right places.

Most of us are familiar with recording sounds with our PCs, but what about capturing moving video? How do you do it, and more to the point, why would you want to? You could edit existing material or your own footage and re-record it back onto tape; or perhaps distribute it, say, on CD-ROM; you might even want to put it on a web site.

Today's personal computers are at a stage where they are fast enough, cheap enough and have the necessary capacity (memory and hard disk) to record and edit digital video, at reasonable quality. You can certainly achieve domestic-video quality without delving too deeply into your pocket. Even low-end broadcast-quality video (typical daily news items) is possible for a few thousand pounds, as opposed to over £60,000 which you would need for specialised professional studio equipment.

To capture video you need a capture board, and in this feature we've reviewed six of them from different manufacturers. They vary in their prices, quality and compression methods. We'll be comparing them, as well as explaining topics related to video editing for a number of purposes. And we have things to say about the all-digital methods of transferring video data which are just around the corner. Common terms and abbreviations are explained in the Glossary on page 113.

Video capture Contents

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Illustration: Kevin O'Keefe

How it all works

In Europe and several other countries, we use a TV system called PAL where each complete picture (frame) is drawn line-by-line, from top to bottom. We use AC electric current that alternates 50 times per second (50Hz). The PAL system ties in with the AC numbers to perform 50 passes (fields) each second. It takes two passes to draw a complete frame, so the picture rate is 25 frames per second (fps). The odd lines are drawn on the first pass, the even lines on the second. This is known as interlaced, as opposed to an image on a computer monitor which is drawn in one pass, known as non-interlaced. Interlaced signals, particularly at 50Hz, are prone to unsteadiness and flicker, and are not good for displaying text or thin horizontal lines.

A video capture board digitises the analogue TV signal, converting each frame into a series of bitmapped images to be displayed and manipulated on the PC. The capture cards take one horizontal line at a time and, for the PAL system, split each into 768 sections. At each of these sections, the red, green and blue values of the signal are calculated, resulting in 768 coloured pixels per line.

Why 768 pixels across? Because the proportions of a TV picture (width x height) are in the ratio 4:3, and you have to end up with square pixels for display on a computer monitor. Out of the 625 lines in a PAL signal, about 50 are used for Teletext and contain no picture information, so they're not digitised. To get the 4:3 ratio, 575 lines times four divided by three gives 766.7. Computers don't like anything but whole numbers, so boards usually digitise 576 lines, splitting each line into 768 segments, which gives an exact 4:3 ratio.

Thus, after digitisation, a full frame is made up of 768

x 576 pixels. Each pixel requires three bytes for storing the red, green and blue components of its colour (for 24-bit colour). Each frame therefore requires 768 x 576 x 3 bytes = 1.327Mb, and one second of video requires 33.175Mb (1.327 x 25 fps).

However, some boards digitise fewer than 576 lines and end up with less information, and most boards make use of the YUV scheme (see glossary). This needs 16 bits (two bytes) instead of 24 bits (three bytes) to represent true colour, so one second of PAL video ends up requiring about 22Mb.

America and Japan use a TV system called NTSC which runs at 30 fps and has 525 lines — their electric current alternates at 60 times per second. NTSC frames are usually digitised at 640 x 480. It fits exactly into VGA resolution, but that's only because the PC was designed in the US and the first IBM PCs could be plugged into a TV.

How large are your windows?

Digitising frames at 768 x 576 (for PAL) yields broadcast-quality (also loosely known as full-PAL) video. It's what's needed for professional editing if you wish to record video, edit it, and then play it back to re-record onto tape. It requires realtime video playback from a hard disk and the limitations are that of the hard-disk transfer rate.

However, if you're capturing video for multimedia movies, for playback from a CD-ROM with or without hardware decompression, you don't need to digitise at the full PAL resolution. Usually half the lines are digitised (either the odd or the even 288 lines), and to get the 4:3 ratio each line is split into 384 sections. This gives a frame size of 384 x 288 pixels (320 x 240 for NTSC), thus

Compression formats

AVI (Audio Video Interleaved) is Microsoft's generic format for digital video in Windows, via its MCI (Media Control Interface). Various compression methods are possible, in real time, non-real time, and with or without hardware help. AVI compression methods follow.

Microsoft Video 1 Fast compression but low ratios. Good for full-motion, moderate-quality video at resolutions up to about 240 x 180.

Microsoft RLE Low compression ratios. Better for clean pictures such as animations than recorded video. Has trouble with frequent scene changes.

Intel Indeo 3.1 and 3.2 Good quality, and fast compression at high ratios, for video running at 15fps at resolutions up to 320 x 240.

Indeo Video Interactive (IVI or Indeo 4.0) Uses Wavelet compression, capable of ratios even higher than MPEG and fractal transforms. Excellent quality, and full-screen (scalable) playback on a fast Pentium, although compression in software is slow. May

prove to be a competitor to MPEG. **Cinepak by Radius Quality** and compression times lie between Indeo 3.2 and IVI. Good detail. Typically 320 x 240 images at 15fps or better. Good choice for playback on Mac and PC.

Fractal transforms These translate the natural curves of a shape into mathematical formulas from which the image can be reconstructed. Quality can be excellent. Compression times are enormous but decompression is fast, and high ratios can be achieved.

M-JPEG (Motion JPEG) JPEG, Joint Picture Experts Group, is a well-known standard for compressing stills. Unlike MPEG, M-JPEG compresses and stores every frame rather than only the differences between one frame and the next. Thus it requires more space than MPEG, but it is more efficient when rapid scene changes are involved, and easier to edit.

Compression techniques which are not usually incorporated in the AVI format include:

MPEG (Motion Picture Experts Group) A series of standards for compressing motion video: MPEG-1 and MPEG-2 are currently most in use, although others are on the horizon.

MPEG-1 (aka White Book standard) was developed for use with Video CD. Assumes 352 x 288 resolution and a transfer rate of a single-speed CD-ROM. Quality can approach that of domestic VHS, although so-called blocking can degrade the picture, especially if there are abrupt scene changes and subtle changes of colour.

MPEG-2 is a newer standard allowing variable compression. Used for distributing films on DVD and digital TV broadcasts. At present too expensive to encode, probably even for semi-professional use.

Apple QuickTime Widely used Apple Mac version of AVI, released about a year before AVI itself. Thought by some to be superior, and has so far been the main medium for cross-platform development between Mac and PC.

requiring about 8.3Mb per second. A similar resolution (352 x 288) is required for grabbing video which will be distributed in MPEG-1 format for Video CDs.

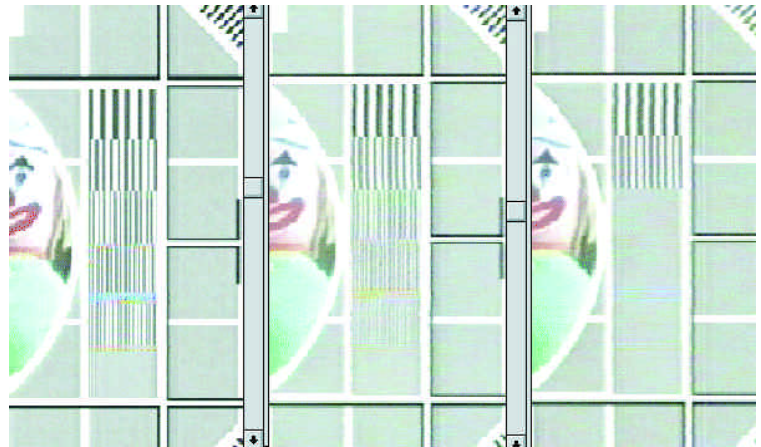
Of course, a large digital-video market is that of video conferencing, including displaying video over the internet. Here, the limitation is in the connection — whether it's an ordinary phone line and a modem, ISDN, cable, or whatever. For example, a 14.4Kbit modem is about 100 times slower than a single-speed CD-ROM, so in this case, high-compression ratios are required. And for real-time video-conferencing applications, hardware compression at very high rates is necessary.

The computer and peripherals

To capture video for editing you need a powerful computer, ideally the fastest Pentium you can afford, lots of RAM (preferably 32Mb or more), an efficient modern graphics card, and a very fast, big hard disk. In fact, there are no hard disks that can handle the transfer rate required to stream full broadcast-quality video, so the video is captured, compressed (using M-JPEG), then put onto the hard disk. At ratios of between about 2:1 to 6:1, you won't notice much degradation in video quality.

The most critical pieces of video-capture equipment are the hard disk and its controller because they determine the sustained data-transfer rate. You need high data transfer rates so you can capture with less compression and thus not lose quality. And you need little fluctuation in performance so that you won't miss frames during capture or skip frames during playback.

So-called audio-visual (AV) drives — Micropolis is famous for them — are specifically designed for these purposes and they only cost about 10% to 15% more than ordinary non-AV models. They're a good investment for video and audio capture enthusiasts or professionals.



A comparison between a live signal (left), one recorded using S-VHS (middle) and one using VHS (right). Note the loss in vertical resolution.

E-IDE and SCSI hard disk controllers should ideally be on the PCI local bus. Those interested in SCSI should check out Adaptec's 2940 range of PCI host adaptors.

Finally, be aware that some capture boards include sound capture and playback, but most don't: they assume you already have a sound card.

The video equipment

The video source is likely to be a VCR, video camera or TV set. Most capture boards possess S-Video inputs as well as composite inputs. To use S-Video you need either S-VHS or Hi-8 equipment. This is more expensive but results in better resolution, therefore more detail.

It's boring to keep stressing, but so easy to forget, that video-capture equipment won't improve bad video material. The thing making the biggest visual difference is the lighting. If you can't have the sun, invest in some proper lights, and get training on how to use them.

Glossary

Aspect ratio The relationship of an image's width to its height.

Brightness The amount of white.

Contrast The range between the lightest tones and the darkest tones.

Luminance The amount of light intensity.

Chrominance Hue (which tint or pigment) and saturation (the amount of tint or pigment).

HSB A model for defining hue, saturation and brightness in their relative percentages.

RGB Way of encoding pictures in computer graphics by describing a colour by the amount of the three basic colours Red, Green and Blue. You need 3 bytes for true colour (three numbers between 0 and 255). Multiply 255 x 255 x 255 and you get 16.7 million colours.

YUV A method of encoding pictures used in broadcasting. Scientists have

discovered that the eye is more susceptible to brightness than it is to colour. Colour television systems process intensity independently from colour using a YUV model. Y is for intensity and is measured in full resolution, while U and V are for colour difference signals and are measured at either half resolution (known as YUV 4:2:2) or at quarter resolution (known as YUV 4:1:1).

Digitising a YUV signal instead of an RGB signal requires a 16-bit number instead of a 24-bit number and saves a third of the storage space.

Most capture boards make use of YUV encoding: some at 4:2:2, others at 4:1:1 or other combination.

NTSC Specifications for broadcasting approved by the National Television Systems Committee in the USA, and used there and in Japan. Basically, it has 525 lines per frame, interlaced at

30 frames per second.

PAL Phase Alternation Line, which is the Western European TV standard (625 lines at 25 frames per second) except in France.

SECAM Sequentiel Couleur A Memoire (Sequential Colour with Memory), which is the video standard for most of Russia and Eastern Europe, and France. It has the same frame rate as PAL but uses 819 lines per frame.

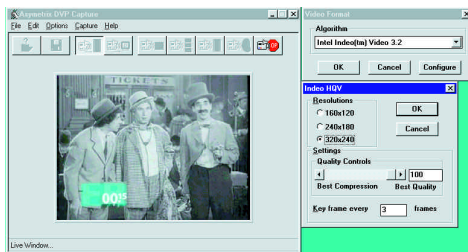
Composite Video A video signal using double-wire phono connections, in which luminance, chrominance, and synchronisation are combined.

S-Video A video signal using four-wire mini DIN connections, with separate luminance and colour components for better quality when recorded to tape because it results in about 400 resolved lines instead of 260. It's used for Hi8, S-VHS and S-VHS-C videotape formats.

Creative Labs VideoBlaster RT300

This relative of the SoundBlaster was Creative's attempt to capture the video market as it did with sound cards. Like the SoundBlaster it's inexpensive and offers a good bundle of software (including Adobe Premiere), but unlike the SoundBlaster it entered a market with a lot more competition and diversity, so it didn't see the same success. Nevertheless, and despite its age (it was released over two years ago) it's a good product in its area.

It's a full-length ISA board with four inputs (three composite video and one S-Video: only one can be used at any one time, of course) and it supports PAL and NTSC (again, no SECAM). Installation is easy: there are jumpers to set, but the default values worked fine. It requires one interrupt value and one base address value free.



This is purely a capture board — there's no video Out for sending back to a VCR. It captures, compresses and stores in one go, and captures up to 30 frames per second at 320 x 240 using Intel's Indeo 3.2 compression (there's an on-board i750 chip). This compression works at ratios between about 15:1 and 32:1. Indeo 3.2 can play back using software-only drivers

available with the Video for Windows runtime (for 3.x) and is one of the built-in video codecs of Windows 95.

The picture is good for an Indeo 3.2 board. Boards like Intel's Smart Video Recorder give similar results but are dear.

PCW Details

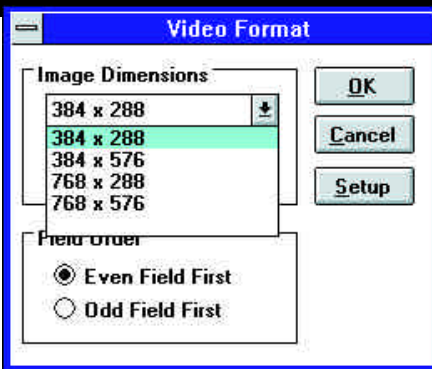
Price £299 (plus VAT)
Contact Creative Labs (UK) 01734 344322
Good Points Good value for money, good-quality picture, distribution-ready video format.
Bad Points Indeo is a distribution compression method and is not great for editing.
Conclusion Best choice if you want to capture in Indeo 3.2 in real time.
 ★★

Diamond Crunch It

This board has two flavours. The ISA version is 18 months old and was made by Spea, now taken over by Diamond. A new version (out soon) is a similar PCI product with bus mastering. It will be called Crunch It 2000 and will replace the present model.

Crunch It digitises using YUV 4:2:2 and compresses to M-JPEG, using Zoran chips similar to those in the AV Master and the DC30. Compression ranges from 8:1 to 120:1. On the new card it will be 4:1 to 100:1.

It can capture the full PAL resolution of 736 x 576 pixels at 50 fields per second. You can also capture at 736 x 288, 384 x 576 and 384 x 288. The board has three video inputs (two composite and one S-Video), together with one composite output and one S-Video Out for playing back video from a hard disk to a TV or VCR. It



accepts all three standards: PAL, SECAM and NTSC.

There's no audio capture, but for the cost of this board you can't expect everything. No other board at this price gives you full-PAL capture of both fields at such

low compression ratios, and the quality is comparable to the twice more expensive DC30 and AV Master. The board is certainly better than others at the £350 mark.

The Crunch It 2000 will be bundled with Ulead Media Studio 2.5 VE and will interface with other Diamond cards which will provide overlay facilities.

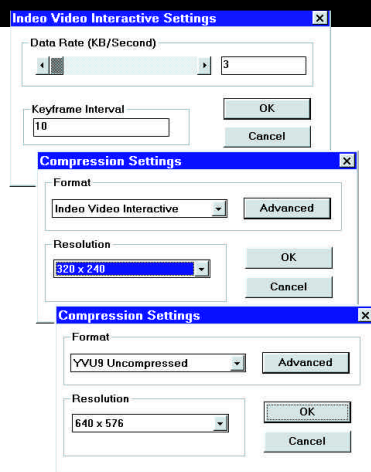
PCW Details

Price £369 (plus VAT)
Contact Diamond Multimedia 01189 444400
Good Points Low price, good picture.
Bad Points Overlay only with Diamond cards.
Conclusion Best value-for-money M-JPEG card.
 ★★★★★

Digital Video Arts WakeBoard

This half-length PCI board offers high quality. It grabs and compresses in real time using Intel's Wavelet-based compression codec (IVI). Similar to MPEG in quality, it can play back in software-only on 486/66MHz and above machines. Video conferencing, net video and commercial multimedia are possible as Wavelet compression reaches higher ratios than MPEG.

The board has a single S-Video, composite input and similar outputs, but there's no audio capture: you have to use a sound card. It captures NTSC and PAL (no SECAM here) using YUV 4:2:2 and has a throughput of about 3Mb/sec. This is adequate, but if higher it could have been a competitor to the AV Master and DC30 for high-quality video editing as it also supports two other capture options: WakeBoard compression, similar to the M-JPEG used on



the AV Master, DC30 and Crunch It (but here you get only 15fps at full PAL); and YUV9

which is a 9-bit uncompressed capture format. Our experiments showed the latter had the clearest pictures. Because of the high data-rate we only got 15fps at 320 x 288.

Options include real-time MPEG-1 encoding and the WakeBoard comes with Adobe Premiere LE.

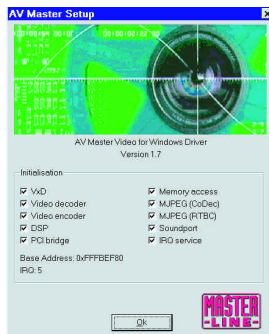
PCW Details

Price £850 (plus VAT)
Contact Strategies 01823 665100
Good Points Three compression methods including IVI. Good for video conferencing.
Bad Points Not cheap.
Conclusion Versatile: covers most digital video capture needs.
 ★★★★★

Fast AV Master

Fast was a pioneer in the video-capture field. The board that made it famous, the Screen Machine, is still around, and is still one of the best products for single-frame capture. The AV Master is Fast's latest product (released less than a year ago) and is top of the company's home range. Cheaper products from Fast are the F60 and the Movie Machine, while a more expensive board, the PCI DV Master with FireWire digital input/output, will be available soon.

The AV Master is a full-length PCI board with bus mastering. It has one S-Video and one composite output, one S-Video input which also acts as a composite Out (with a



11kHz, 8-bit or mono).

As for software, you get Ulead Media Studio 2.5, Flying Fonts, MediaCache (a memory manager for smoother playback), and a proprietary capture program which accesses the board without

supplied adaptor), and stereo In and Out mini jack audio sockets.

The board captures at YUV 4:2:2 using M-JPEG compression (from 4:1 to 100:1 for Full-PAL) using Zoran chips similar to the miro and Crunch It ones. It can capture one or both fields for PAL, NTSC and SECAM, plus audio at 44.1kHz or 22kHz (16-bit) stereo. There are no other audio capture options (like

using the Windows drivers.

The board supports inlay with many graphics cards: it displays M-JPEG video on your computer monitor, which eliminates the need for an external TV monitor.

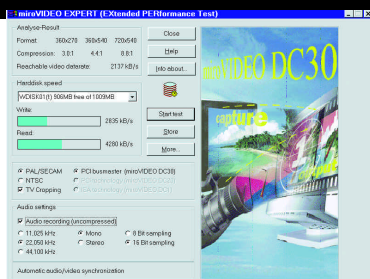
PCW Details

Price £799 (plus VAT)
Contact Fast Electronic UK 0181 968 0411
Good Points Smooth playback. Good for outputting edited video to tape.
Bad Points Some limitations in audio-capture options.
Conclusion Suitable for applications that require outputting edited video to tape.
★★★★

miro DC30

This is miro's top-of-the-range board. It's a half-length PCI board with bus mastering. The DC30 has a single S-Video and a single composite video In, and similar video outputs for playback to VCR or TV. It has stereo In and Out via phono jacks attached to a supplied DIN plug adaptor. Unlike Fast's AV Master you can capture at every standard Windows audio-capture combination: 11, 22 or 44.1kHz, stereo or mono, 8 or 16 bits.

Installation was easy, although the utility which checks the hard-disk transfer rate over-estimated our hard disk's capabilities. Configuring the sound capture wasn't easy at all but we did get it working in the end. The board digitises at YUV 4:2:2 and accepts PAL, NTSC or SECAM. Compression is done using a Zoran chip so as low as 3.5:1 for Full-PAL, since the board



can manage a transfer rate of 6Mb/sec.

There are more capture options than on the Fast product, including wide-screen 16:9. The board supports hardware acceleration for video rendering using Adobe Premiere (bundled) and video overlay (for displaying on a monitor) using DirectDraw. This didn't work with our Matrox Millennium card, but we're told it works with others. You get Adobe Premiere LE, Photoshop LE

and Asymetrix 3D F/X.

A new, budget miro FireWire DV digital-only board will be available soon. This will work on its own and with the DC30, allowing S-Video or composite outputs.

PCW Details

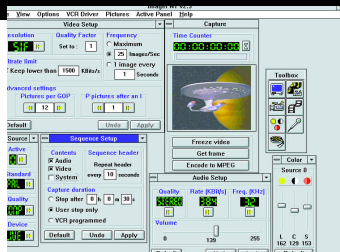
Price £799 (plus VAT)
Contact miro UK 01494 510250
Good Points Best picture quality of all the M-JPEG cards.
Bad Points One or two minor installation difficulties, though nothing to worry unduly about.
Conclusion Best card in terms of quality and number of features.
★★★★★

Vitec Video NT Pro

This is the only board of the bunch which captures and compresses files to MPEG-1 standard rather than M-JPEG, and in real time too. It's the company's second attempt at a real-time MPEG encoder. The earlier Video NT captures at half the frame rate and with no MPEG sound, but is still available at £300.

The NT Pro itself is an ISA half-length board for Windows 3.x and 95. It has an S-Video and composite input, stereo audio In, similar connections for output and a SCART connector. The output is for monitoring only, not for MPEG playback, for which you need a card like Reel Magic or, on a Pentium, a software decoder (the new MS ActiveMovie — free on the net — plays MPEG quite well).

For those who know about MPEG, the NT Pro can grab P and I frames but not B frames, and only Level 1 audio. This means



that not all MPEG decoders on the market can play back the captured video, which looks good. It's not up to the quality of semi-professional equipment, but that costs over £5,000. Programs (from Xing, CeQuadrat, and Ulead) which turn AVI to MPEG yield similar results but take an hour to compress one minute of video on a Pentium 133.

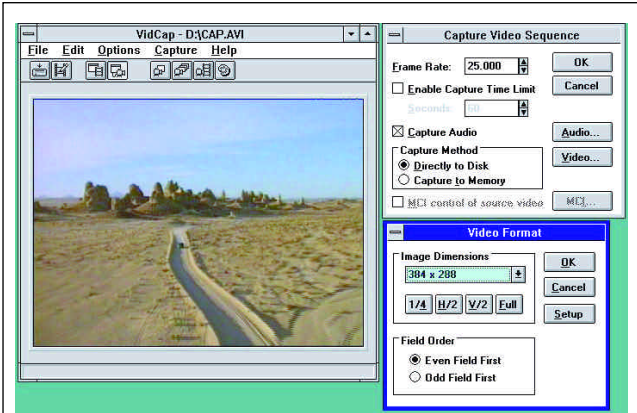
The Video NT Pro accepts PAL, NTSC or SECAM and captures at standard MPEG-1 resolutions for these formats (352 x 288 for

PAL), half that, and the non-standard 384 x 288. Audio capture is at 48, 44.1 and 32kHz, at various compression ratios.

A video-capture program is free, with a batch mode for a VCR and MCI drivers, plus there's an MPEG editing program and a CD-ROM with other utilities.

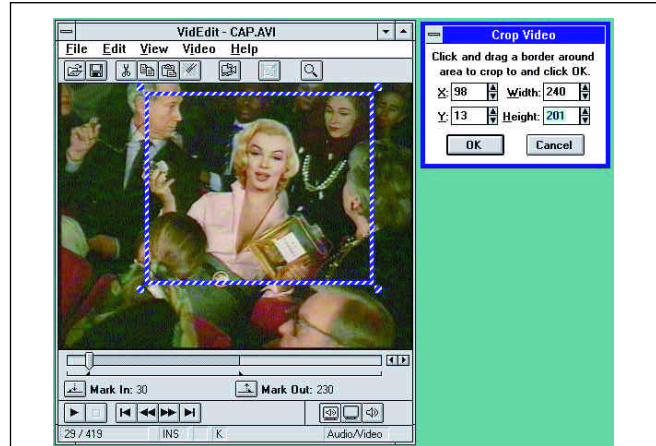
PCW Details

Price £699 (plus VAT)
Contact Imago Micro 01635 861122
Good Points Hardly any competition at this price.
Bad Points Some limitations in the way it compresses mean that playback is not supported by all boards, but it does work with ActiveMovie.
Conclusion Best choice if you want to capture MPEG-1 files and you have a limited budget.
★★★



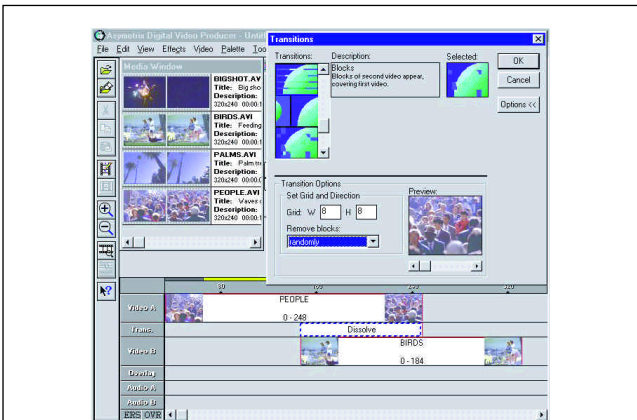
Video Capture

VidCap is bundled with Video for Windows and some boards. It gives control over all aspects of capture: defining the source, video format and audio format. It lets you pre-allocate contiguous hard disk space to a capture file, reducing the number of dropped frames.



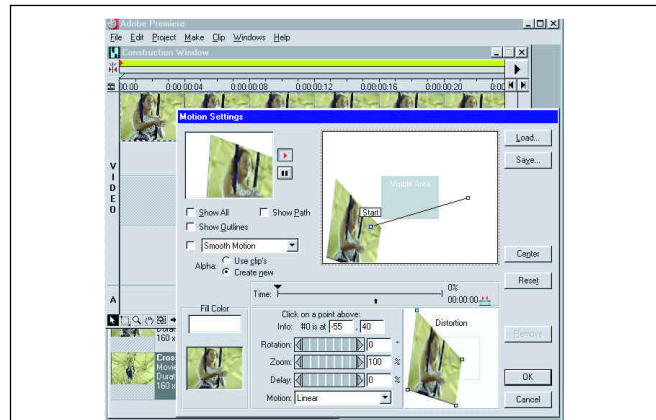
Simple editing

For cropping bits, resizing, cutting out sections and reducing the number of colours, simple programs like VidEdit are easy to use and faster than more sophisticated programs like Adobe Premiere.



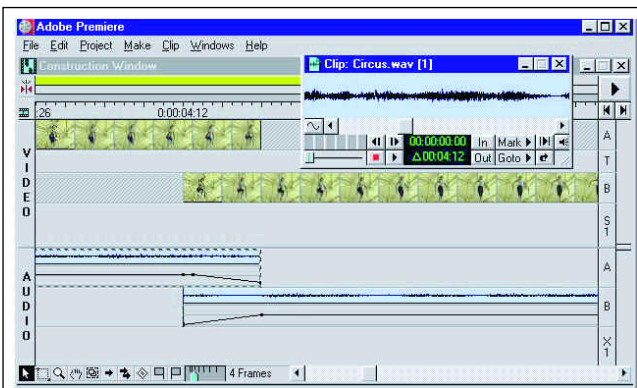
Digital Video Producer's transitions

For elementary editing involving few tracks, transitions, overlays and simple audio cross-fades, cheap programs like the Asymetrix Digital Video Producer can take you a long way. In fact, this program's capture facility and its 3D titling tools are very good.



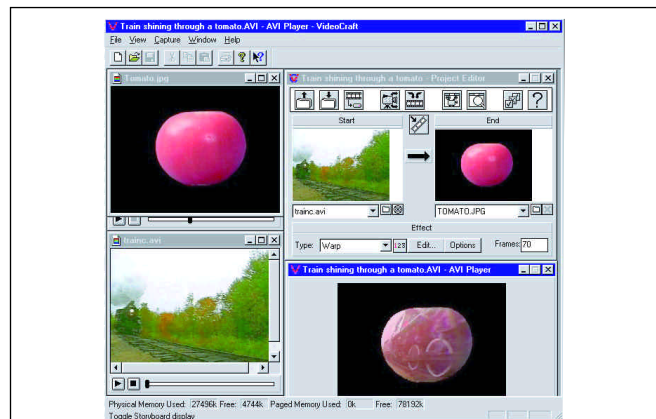
Premiere effects

For editing needing synchronisation with external hardware, or requiring sophisticated effects, Adobe Premiere offers the lot. You can use the Photoshop Plug-in effects to do anything you can imagine. Similar to Premiere's facilities are Ulead's Media Studio 2.5.



Premiere audio

Although not as good as a dedicated multitrack sound editor, Premiere provides the best facilities of all video-editing programs for editing and mixing audio in video clips. You can drag audio levels and shape them as you want to make the sound fade nicely in and out of scenes.



VideoCraft

For special effects, check out VideoCraft. It evolved into a video-effects tool from PhotoMorph, which specialised in morphing. Turn any digital image into another one, do transitions, warps, distortions and titling, or make a passing train shine through a tomato.



Editor's Choice

We can recommend all six boards since they're the best and/or newest from about 20 models currently on the market. Which one to choose from these six depends on your pocket and requirements.

For distributable files and capture in real time with little editing, choose between the RT300, the WakeBoard and the Video NT, depending on whether you want Indeo 3.2, IVI or MPEG files.

If your video requires editing after capture, go for one of the M-JPEG boards (Crunch It, AV Master, miro DC30, or WakeBoard). You can play back to video

or re-compress to higher compression ratios for distribution, using software codecs (even Indeo 3.2, MPEG or IVI, but this will take longer than using the real-time capture, of course).

There isn't that much difference between the AV Master and the miro DC30, but we prefer the DC30. The AV Master is sharper, but creates more visible noise which is a problem at recompression. The pictures from the miro look slightly clearer when the content is dull — that is, not containing a large variation in colour. The AV Master may be better if you capture, edit and then output to

video, while the miro will be a better choice if you'll be capturing, editing, and re-compressing to AVI or MPEG.

We think the audio-capture facilities on the miro and Fast boards are a waste of money: it's too late, since almost everyone has a sound card. The sound quality offered by these two boards was no better than that of a good sound card.

Some of the cleanest pictures were grabbed by the WakeBoard using no compression. The Crunch It board offers good value for money and quality not that different from the two expensive boards.

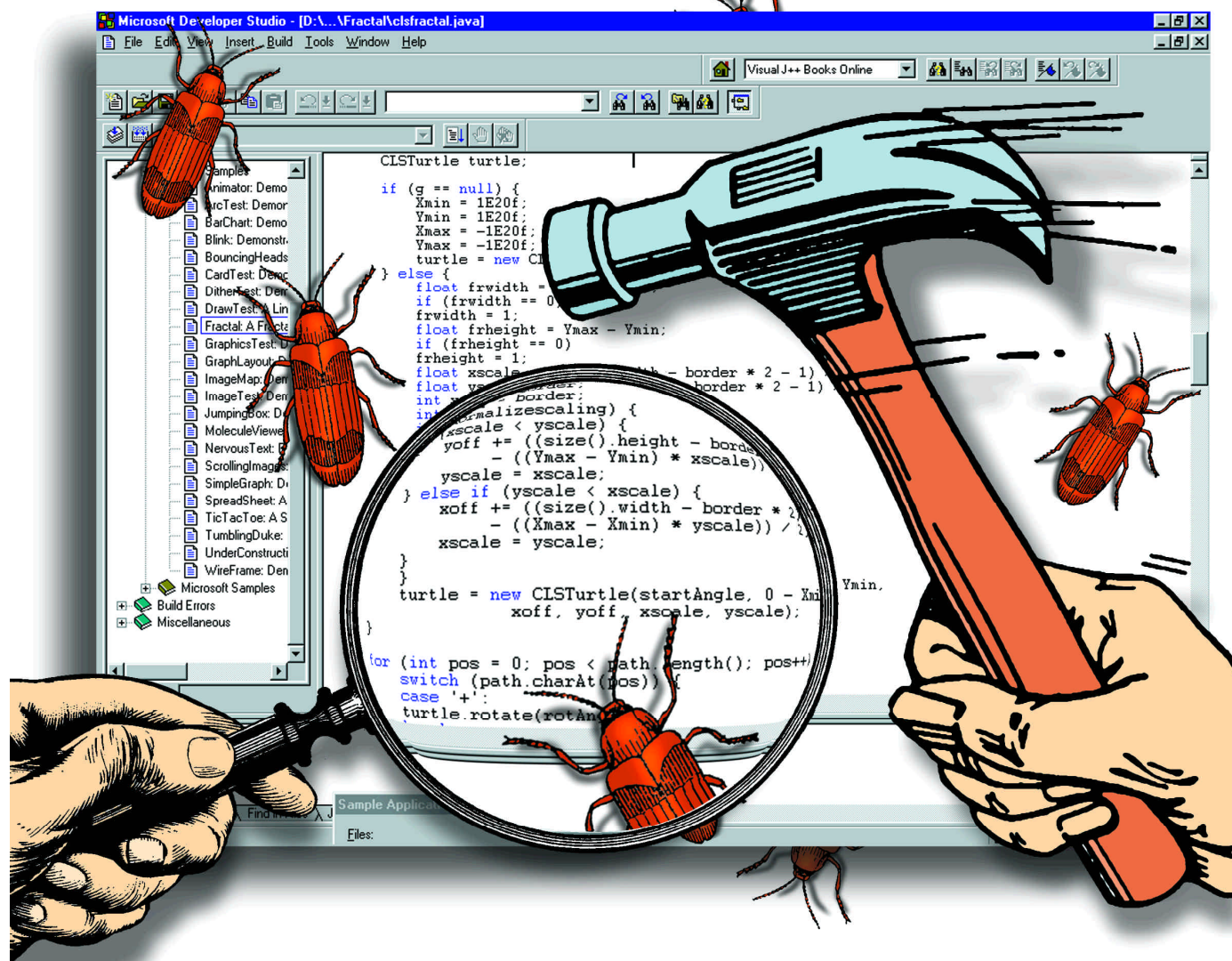
The best overall board is the DC30.

Table of Features

Manufacturer	Fast	miro	Diamond Multimedia	Digital Video Arts	Vitec	Creative Labs
Product	AV Master	DC30	Crunch It	Wakeboard	Video NT Pro	RT300 2.0
Price	£799 (plus VAT)	£799 (plus VAT)	£369 (plus VAT)	£849 (plus VAT)	£699 (plus VAT)	£299 (plus VAT)
Supplier	Fast	miro	Diamond	Strategies	Imago Micro	Creative Labs
Phone	0181 968 0411	01494 510250	01189 444 400	01823 665100	01635 861122	01734 344322
Interface bus	PCI	PCI	ISA / PCI	PCI	ISA	ISA
Board size	Full	Half	Half	Half	Half	Full
Number of Video Inputs						
Composite/S-Video	1 / 1	1 / 1	2 / 1	1 / 1	1 / 1	3 / 1
Number of Video Outputs						
Composite/S-Video	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1 & SCART	0 / 0
On-board Audio	●	●	○	●	○	○
TV Video Formats						
PAL/NTSC/SECAM	●/●/input only	●/●/●	●/●/●	●/●/○	●/●/●	●/●/○
CCIR 601 (WideScreen)	○	●	○	○	○	○
Overlay/Inlay	○/●	with Direct Draw /○	with Diamond S3 cards	○/○	○/○	Not required
Video Capture						
Largest frame size for PAL	768x576x25fps	768x576x25fps	768x576x25fps	640x576x15fps	384x288x25fps	320x240x30fps
Smallest frame size	384x288	384x288	384x288	160x120	176x144	160x120
On-board Compression						
M-JPEG	●	●	●	●	○	○
MPEG-1	○	○	○	optional	●	○
Intel IVI	○	○	○	●	○	○
Intel Indeo 3.2	○	○	○	○	○	●
Min. compression (MJPEG)	4:1	3.5:1	4:1	4:1	n/a	n/a
Max. compression (MJPEG)	100:1	100:1	120:1	100:1	n/a	n/a
Bundled Software	Ulead Media Studio 2.5 VE Crystal Flying Fonts LE	Adobe Premiere LE Adobe PhotoShop LE	Media Studio 2.5 VE	Adobe Premiere LE Intel IVI VidCap32	MPEG Maker Video Clip AVI Video Clip MPEG	Adobe Premiere LE
Requirements						
Processor	486 66	Pentium 100	486 66	Pentium	486 66	486
System	Windows 95	Windows 95	Windows 3.1/95	Windows 95	Windows 3.1/95	Windows 3.1/95
RAM	16Mb	16Mb	8Mb	16Mb	8Mb	8Mb

Footnotes: ● Yes ○ No

Fast AV Master Composite out is on the same socket as S-Video out and uses a supplied adaptor. SECAM is supported for input only. **miro DC30** Overlay is only through graphics cards that use DirectDraw. **Diamond Crunch It** Overlay is only with some Diamond cards. **WakeBoard** MPEG-1 compression is an additional option. **Vitec Video NT Pro** Outputs are for monitoring only — not for playback.



Visual Development Tools

Drag-and-drop programming has moved on. The latest crop of visual programming tools perform rapid development without compromising performance. Tim Anderson surveys the scene.

Visual Development Tools

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- 131 Visual C++ 4.2
- 134 Visual FoxPro 5.0
- 135 Java Workshop
- 135 Visual J++
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- 137 Visual InterDev (beta)
- 137 Visual Basic 5.0 (beta)
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It is a great time to be a software developer. An array of new tools is on offer, while old favourites are greatly improved. Features like object orientation and native code compilation are now the norm and programming environments are becoming more visual and more powerful.

Alongside these incremental improvements, there are two new factors which have come into play since we last looked at visual programming, just over a year ago. Both have seemingly unstoppable momentum. I am referring to the World Wide Web and to Java, the internet programming language.

The web is changing the way in which people use computers, from the user interface through to back-end servers. Java is not just a new language with enticing features but may become a platform in the same way that Windows is a platform, with its own native components for visual developers to play with.

Despite these innovations the real world, for most of us, is PCs running Windows. Even here, though, the impact of the web is enormous. Microsoft has been busily redefining Windows into a more web-like environment, with many implications for developers. At the same time, the company is taking a curious line over Java, appearing to support it enthusiastically while also competing against it.

The aim of this group test of visual development tools is to bring the picture into focus on behalf of developers asking themselves which visual programming tool they should adopt.

There are reviews of the key products, previews of important packages still in beta, and summaries of relevant technologies such as ActiveX and HTML. Note that some products, such as Visual Basic and Delphi, receive shorter reviews because the versions are the same as in our previous round-up.

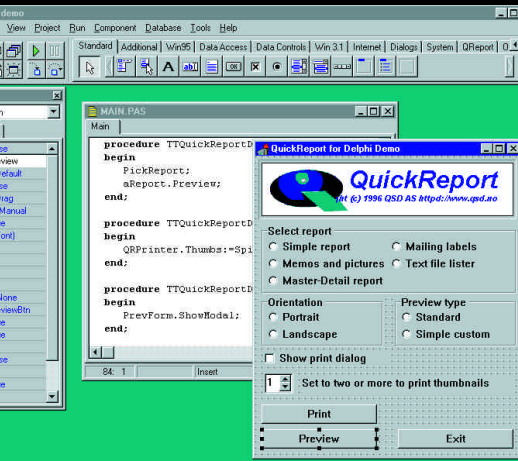
Illustration: PAUL SHORROCK

Delphi 2.0

Borland's popular tool for rapid application development is based on Object Pascal, a version of Pascal that has to be so extended and adapted that it is effectively a proprietary language. Like other evolved languages, it is a hybrid which can be used either for procedural or object-oriented code.

The secret of Delphi is the Visual Component Library (VCL), a class library which encapsulates the Windows API. VCL components can be positioned visually, using Delphi's form designer, or manipulated entirely through code. Borland's native code compiler is exceptionally fast and the result is a sweet combination of ease of use, rapid development and good performance.

You can reuse code in Delphi by building your own components — which can be based on existing VCL classes — and integrating them into the development environment. Database features arrive via the Borland Database Engine — the same component that is used in Paradox and Visual dBase. This gives native access to dBase and Paradox tables or client-server access to several SQL databases including Oracle, Sybase, SQL Server and Borland's own



Borland's Delphi: Still the best all-round visual programming tool

Interbase. Other data sources are available through ODBC.

Sensibly coded Delphi applications perform well and are easy to distribute. Executables are relatively small and apart from the database engine require no runtime files. Another plus is that Delphi works well for both simple utilities and large applications. Most problems can be solved without resorting to other languages. Calling the Windows API is easy and unrestricted and tricky things like callback functions or owner-draw controls are no problem.

Delphi has failings and it is important to be realistic. To do advanced work in Delphi you

need to be comfortable with using pointers, and familiar with the Windows API. The documentation is notoriously poor, although source for most of the VCL can be obtained. It is a Windows development tool, and of no use for cross-platform work. You can create OLE automation servers but not ActiveX controls.

Another problem is that since Delphi compiles each application to a single large EXE, you waste disk space when more than one Delphi application is installed. However, Delphi 97 promises to fix at least these latter two problems.

PCW Details

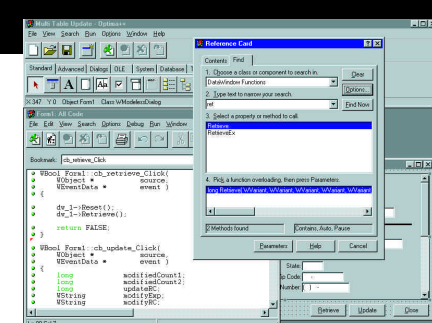
- Price** Learning edition £69. Developer £395. Client/Server £1,275. (All prices exclude VAT)
- Contact** Borland 0800 454065
- Good Points** Fast compiler. Elegant, productive class library. Visual tools.
- Bad Points** Documentation. No ActiveX creation. Large database runtime.
- Conclusion** The best combination of power and ease of use.

★★★★

Optima ++ 1.5

Traditionally, Watcom C++ was a compiler known equally for good quality output and a terrible development environment. That reputation is turned on its head by Optima. The Watcom compiler is now the engine of a slick visual development tool. Optima is based on a new class library designed for VB-style drag-and-drop programming. Components are installed on a tabbed palette (the spitting image of the one in Delphi) and ActiveX controls can be installed by creating a wrapper class with a component wizard. Optima's form designer is *real* visual programming, where you paint an interface on a form, set component properties with a property sheet, and double-click an event list to write event-handlers.

Optima implements drag-and-drop programming with the reference card tool. You can invoke it whenever the code editor is open. Drag a listbox component into the code window and the reference card pops up, showing all its properties and methods in a tree view. Choose a method, and a parameters button throws up a dialog showing the correct parameters and letting you enter values. Click Finish, and the C++ code for the method is pasted into your code, complete with the chosen parameters. Optima's data access is based on ODBC. You can place a transaction object on a form and connect to a data source by setting its properties. You can then link a query object



Optima's reference card gives you quick access to an object's properties and methods

to the transaction and construct a query using a simple visual query builder. Many of Optima's controls have a datasource property which lets you bind them to fields in the query, making it easy to create simple database applications. Optima comes with ODBC drivers for popular desktop databases and a version of Sybase SQL Anywhere.

Owners of the Professional or Enterprise editions get PowerBuilder's datawindow integrated into the system. Deceptively simple, it is an ActiveX control for displaying data queries or reports. At design time, right-click and choose Edit to open a complete database management system with visual tools for creating tables, queries, views, reports, graphs and more. You can also control the datawindow object via code at runtime. It is the best of both worlds for developers wanting to combine

PowerBuilder's data management with Optima's strong application development tools, with the bonus of standard C++.

There are one or two disappointments. We couldn't find an easy way to create new C++ components and install them on Optima's palette. You can add ActiveX controls, but Optima gives you no help in creating them. A general concern is lack of portability. Although it uses standard C++, Optima's class library is unique to Optima, and applications will not compile elsewhere.

Optima is a great product, offering rapid development, with visual tools that leave Microsoft's Visual C++ in the shade. The bundled database, SQL Anywhere, is good, certainly more suitable for today's small networks than desktop databases.

PCW Details

- Price** £139 Developer, £329 Professional, £1,350 Enterprise. (All prices exclude VAT)
- Contact** Powersoft 01494 555 555
- Good Points** Fast C++ development with strong database tools.
- Bad Points** No way to create new visual components.
- Conclusion** Deserves serious attention from C++ database developers.

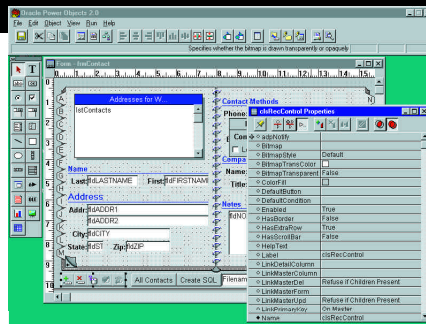
★★★★

Power Objects

When Oracle discovered that its customers were using Visual Basic to build clients for Oracle databases, it responded by creating its own alternative. Power Objects sports a slick development environment that looks at home in Windows 95 surroundings.

Power Objects 2.0 is now a more mature product than version 1.0. The code editor is better, ODBC connectivity is provided and there is a new local database called Oracle Lite. It has an integrated report designer, but Crystal Reports 5.0 is also bundled for more complex reports. Applications are interpreted, and you can compile to a pseudo-code executable for distribution. Another option is to create a standalone executable which bundles the runtime library into one large file.

Power Objects supports limited object orientation through visual classes. When an application is open, you can insert a user-defined class by choosing New Class from an object menu. Classes can contain visual objects, in the same way as a form, or you can add custom properties and methods. You can then create instances of the class by dropping its icon on a form. A new class can be based on an existing one, inheriting its characteristics. Classes in Power Objects are easy to use, but are really more like custom controls than traditional classes. A major limitation is that you cannot instantiate a class in code, but only at design time. A major goal of Power Objects is to simplify robust



The property sheet shows properties and methods, including those defined by the user

database access by controlling data at several levels. You connect to a database via a session object containing data tables, views and sequences (a sequence is a means of generating unique values for a table). Sessions have methods for commit and rollback, including support for two-phase commit. You can override these methods with your own code. The next layer is the recordset object, representing all or part of a query result. Bound controls are populated from recordsets. In this kind of setup, data validation can take place in the interface code, or at the recordset level, or at the session level, or at the back-end database level. The Power Objects model encourages the developer to introduce appropriate checks and constraints so that data integrity is preserved.

The Power Objects design environment is

an OLE automation server, but applications cannot act as automation clients. You can host ActiveX controls, though, and these are easily installed using a custom controls dialog. The 16-bit version supports 16-bit OCX but not the more useful VBX format. Web publishing is supported via a Netscape plug-in, also supplied as an ActiveX control for Internet Explorer, which lets you run Power Objects applications on the web.

Power Objects is a product with a tight focus and will appeal to developers who would otherwise use VB. Overall, Power Objects is less complete and powerful than VB, but makes it easier to construct a secure and robust database client. It is especially well suited to Oracle systems, so Oracle sites should take a close look.

POW Details

Price Client/Server £1,250, Desktop £250, (both prices excl. VAT)

Contact Oracle 01 18 924 0000

Good Points Cross-platform. Tidy interface. Protects data integrity.

Bad Points Not an OLE automation client. Unsuitable for large applications.

Conclusion Although ideal for Oracle sites it's also worth consideration by others.

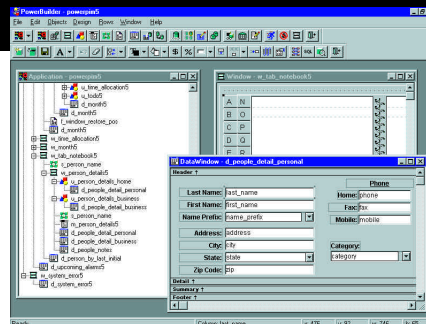
★★★

PowerBuilder 5.0

PowerSoft has two products in this review. One is the new C++ product, Optima++, and the other is PowerBuilder, a well-established application builder for database systems. Both products have much in common: the datawindow (the centrepiece of PowerBuilder's database connectivity); many of the add-ons are the same; and both use the Watcom compiler to create native code executables.

Despite this, PowerBuilder's approach is strikingly different. Whereas Optima invites you to begin by designing a form, Powerbuilder projects begin with an application object. Then you use a variety of "painters" (visual design tools) to build application elements. These include windows and menus for the user interface, datawindows which retrieve and display data, and scripts to provide the logic behind the application. Powerbuilder's user interface is not particularly intuitive, but it offers excellent code reuse via user-defined objects, which can be stored in libraries.

Powerbuilder has strong attractions for client-server development. It is a cross-platform product targeting all varieties of Windows, the Macintosh and some Unix. PowerBuilder is database-independent, and uses either ODBC or native drivers to connect to servers. Advanced users can create distributed applications, introducing a third tier between the client and the database



Applications are assembled with the Application, Window and DataWindow painters

server. This is done by invoking remote objects. A proxy object on the client makes it easy to call the remote object's properties and methods, while a connection object provides the information needed to find the object on the network. Possible transports include TCP/IP and named pipes.

The full PowerBuilder package is generously supplied with add-ons. Along with SQL Anywhere and tools for report design and version control, there is the PowerBuilder Foundation Class Library which will provide an excellent structure for your application. Two CDs are devoted to online documentation and resources. There is also C++ Class Builder, for creating support DLLs for PowerBuilder, again using the Watcom compiler. OCX controls can be included, and several from the Visual Components suite are supplied including a version of the Formula 1 spreadsheet control.

PowerBuilder also supports OLE automation as client and server. Web publishing is catered for in several ways. You can export from a datawindow to HTML. For dynamic data publishing, the PowerBuilder Window plug-in lets you run an application within a web browser.

For creating client-server solutions, PowerBuilder is a strong contender. Version 5.0 has good cross-platform support and strong OLE features when run on Windows. But there are reservations. It is hard to learn, and the development environment needs improving. PowerScript is a proprietary language and you may need to supplement it with C++ code. Although it is not suitable for general-purpose programming, in the right context, PowerBuilder is a winner.

POW Details

Price Desktop £195, Professional £965, Enterprise £3,295 (all prices exclude VAT)

Contact Powersoft 01494 555 555

Good Points Reusable objects. Distributed applications. Cross-platform. Database independent.

Bad Points Proprietary language. Weak interface. Hard to learn.

Conclusion The best dedicated client-server development tool.

★★★★

VisualAge Basic

IBM's VisualAge tag applies to a spread of products across a range of platforms. Languages vary from SmallTalk, to C++, to COBOL and, soon, Java. Platforms include OS/2, AIX and Windows. All the VisualAge products emphasise the construction of applications from parts, which can be assembled into applications by a visual builder. Conceptually impressive, the problem with VisualAge tools has been sluggish performance, in development and finished applications. The products are wholeheartedly object-oriented and are looking increasingly impressive as hardware improvements make performance less of an issue.

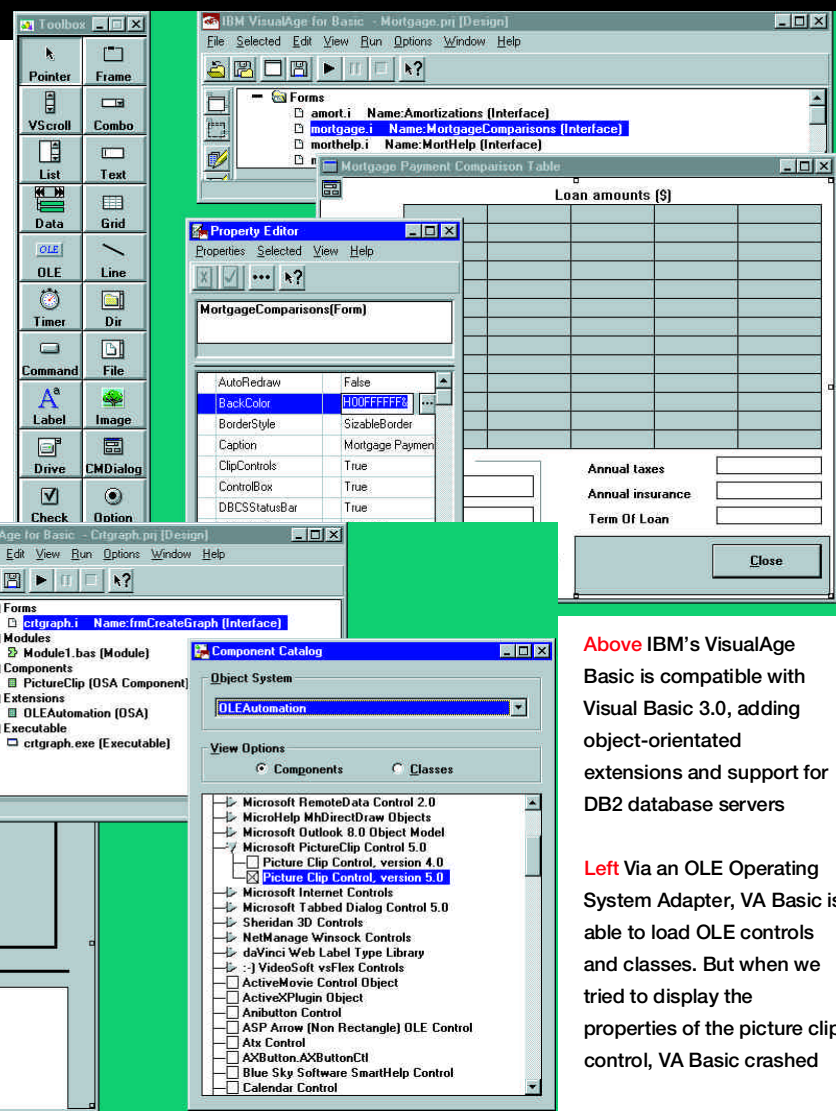
The odd thing about VisualAge Basic is that it fits uncomfortably into the series. It looks as if IBM saw the popularity of Visual Basic on Windows, including its use as a client for IBM databases, and set out to provide its own version for Windows and OS/2.

Choosing VB 3.0 as the base product, IBM has aimed for full compatibility, while adding object-oriented extensions and support for technologies strategic to IBM, like SOM objects, OpenDoc, and integration with DB2, IBM's cross-platform server database.

Somewhere along the way, the characteristic Visual Builder got lost and the interface looks more like Visual Basic than VisualAge. The product is shipping at a reasonable cost, with versions for OS/2 and Windows 95 or NT included on the CD.

IBM has never been famous for elegant graphical interfaces, and VisualAge Basic runs true to form. There are no luxuries like tooltips, docking toolbars or pop-up menus. It is not an MDI application. When you start it up, three floating windows open, one containing the VisualAge Basic menus along with a list of project components, another showing a chunky toolbox and a third displaying a blank form. VB developers will feel reasonably at home, and some keystrokes are the same; for example, F4 to open the properties window. You can import VB 3 applications, and most code should run. The catch is that VisualAge Basic cannot use VBX components, and does not attempt to find OCX equivalents. The only exceptions are GRID.VBX and CMDIALOG.VBX, which are intrinsic in VA Basic.

Another problem is with database code. There is a data control, but it can only link to ODBC data sources, whereas VB 3 uses the JET engine. VA Basic has dynaset and



Above IBM's VisualAge Basic is compatible with Visual Basic 3.0, adding object-oriented extensions and support for DB2 database servers

Left Via an OLE Operating System Adapter, VA Basic is able to load OLE controls and classes. But when we tried to display the properties of the picture clip control, VA Basic crashed

snapshot objects, but again these only work with ODBC. Like VB, VisualAge Basic is interpreted, and you can compile a pseudo-code executable that requires a runtime library. We noticed that applications typically ran more slowly in VA Basic than in VB 3.

The presence of a VB-compatible language on OS/2 should prove useful in situations where both OS/2 and Windows are used. On Windows, though, there is little point in producing a Visual Basic clone with an uglier interface. If there is any justification for VisualAge Basic, it is in the IBM-specific extensions. The most notable is object orientation, implemented by a CLASS keyword which lets you declare a new non-visual class, or to subclass an existing visual class. Unlike VB 4.0's class modules, VisualAge Basic does support inheritance.

Another advantage of VisualAge Basic is support for OpenDoc on OS/2, and for SOM on Windows and OS/2. Given the scarcity of useful SOM objects, especially under Windows, this is more of a theoretical than a real benefit. It works through an impressive system of Operating System Adapters which shows that, internally, VisualAge Basic is flexible in its support for external objects. OLE controls are supported through the same

system, although we found that some controls, such as the Rich Text OCX, caused VA Basic to crash.

The biggest benefit VisualAge Basic delivers is for those using DB2 servers. You can create, test and register stored procedures and user-defined functions on DB2, with the server running on OS/2, AIX or Windows. IBM's Call Level Interface can be used to access DB2 family data.

Overall, VisualAge Basic is excellent news if you are running DB2, and good news for OS/2 users, but has little to offer a typical Windows developer.

PCW Details

Price £80 (plus VAT)

Contact 01256 343000

Good Points DB2 support. Inheritance. Runs on OS/2. VB3 compatible.

Bad Points Clunky interface. Slower than Visual Basic. Interpreted.

Conclusion Windows users should probably look elsewhere.

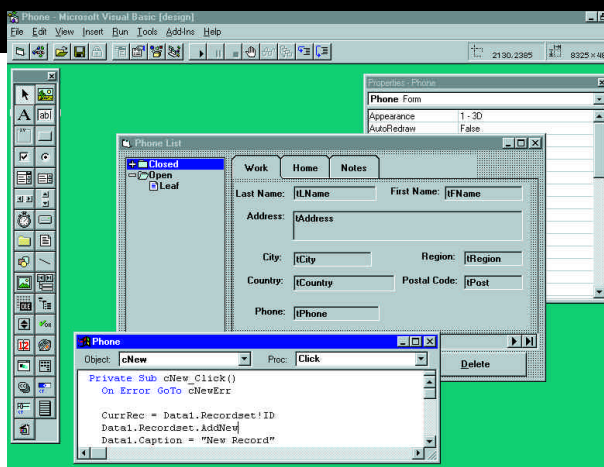
★★

Visual Basic 4.0

The best testimony to the strength of Visual Basic comes from companies like IBM and Oracle, which have shown their respect by releasing look-a-like products. Yes, VB is an interpreted language, less powerful than C++ and not properly object-oriented, but it remains a development tool which people can pick up quickly, soon becoming productive. It also benefits from the widest range of third-party add-ons. VB 4.0 comes in 16-bit and 32-bit versions, with the former understanding VBX and the rare 16-bit OXC components, while the latter standardises on 32-bit ActiveX.

Microsoft's favourite language has come a long way since the early days, supporting a wide range of variable types and partial object orientation via class modules, used for defining non-visual objects. Code reuse is possible through careful class design. The drag-and-drop development environment is highly productive and you can easily switch between design and run mode to test an application. VB can call external DLLs as well as using ActiveX controls, so operations which are beyond VB can be solved by writing extensions in another language such as C++.

Microsoft's priority has been to make VB an ideal environment for using components, easy to use and hard to crash, rather than building in powerful but dangerous features like pointers and direct memory allocation. The product's success bears out the validity of this approach. There are also several areas



VB's drag-and-drop interface has proved highly productive for application building

in which VB excels. It is a flexible tool for database work, with the same database engine as Access, together with several ways to use ODBC data sources. Another strength is OLE or ActiveX, with VB able to do OLE automation as client or server. Additionally, increasing use of VBA in Microsoft Office and other applications makes VB useful for integrating Windows applications.

The danger with Visual Basic, though, is that projects grow into large, code-intensive applications for which the language is simply not suited. Even small applications carry a lot of runtime baggage, and OLE itself is not always robust and reliable; the darker side of VB's friendly face.

PCW Details

Price £79 Standard (32-bit only); £379 Professional; £745 Enterprise (prices excl. VAT)

Contact Microsoft 0345 00 2000

Good Points Easy to learn. Hard to crash. Strong database features. Zillions of add-ons available.

Bad Points Large runtime files. Limited power. Poor performance in complex applications.

Conclusion A great all-purpose tool, but not usually the best.

★★★

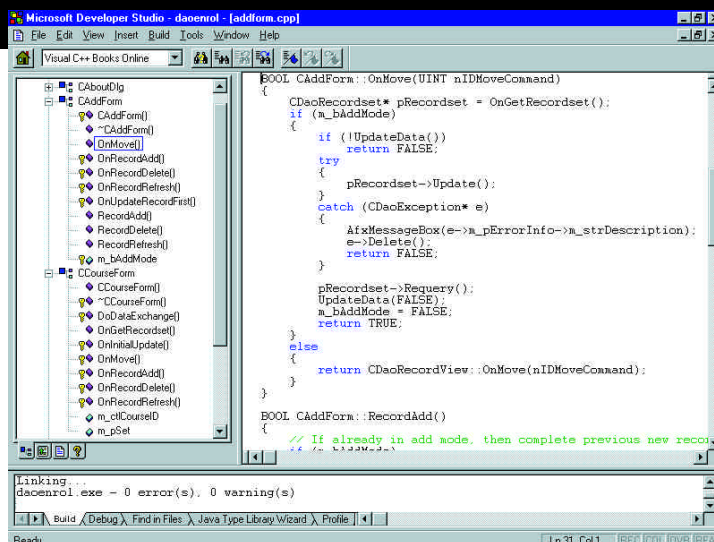
Visual C++ 4.2

Microsoft's C++, which last year was our Editor's Choice, remains a formidable tool. It is hosted in the Developer Studio, which gives it an excellent code editor, debugging features and online help.

Visual C++ is sold by annual subscription with four updates a year. The updates are not just to fix bugs, but provide extensions to the Microsoft Foundation Classes; the class library which encapsulates most features of Windows.

It is this link with MFC that makes Visual C++ a wise choice for those who want to keep up to date as Windows evolves. For example, if you want to implement the new-style flat toolbars which are featured in Office 97, the chances are that MFC will be the first to encapsulate the change. Visual C++ has become a comfortable product for C++ developers. The resource editor is good, it easily accommodates ActiveX controls, it generates fast code, and is well supported by third-party products and class libraries.

Even so, this is a product that looks increasingly dated as the quality of other visual



It has plenty of power, but Visual C++ needs stronger visual tools

What is lacking, though, is visual tools to make database applications easier to construct. For code-intensive applications, or for developers who prefer traditional programming, or if you need MFC, Visual C++ is a good choice. Where there is significant interface building or database work, Microsoft will need to move quickly to keep developers in the fold.

programming tools improves. For visual design, all Visual C++ has to offer is a dialog editor. A class wizard does a good job of generating the event handlers behind dialog controls, but that is no longer enough. The Reference Card in Optima++ shows that a lot more can be done to make drag-and-drop programming work in C++. Similar observations apply to the database features. MFC has excellent support for data access, through ODBC and data access objects including ODBC Direct for best performance.

PCW Details

Price Around £390 subscription (plus VAT)

Contact Microsoft 0345 002000

Good Points Slick coding environment. Fast applications. Keeps up to date with Windows.

Bad Points Looks old-fashioned next to other, more productive, visual tools.

Conclusion Still good, but visual tools need updating.

★★★

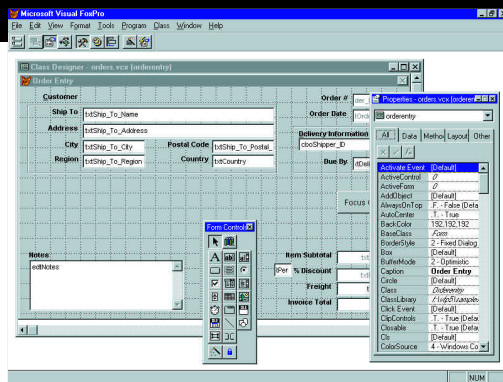
Visual FoxPro 5.0

FoxPro is proof that not everything Microsoft touches turns to gold. When it was acquired from Fox Software, dBase-compatible systems were dominant in desktop databases and FoxPro was the leading contender. Neither dBase nor FoxPro made an easy transition to Windows, and the Fox also suffered from being one product too many in a line-up which includes Access and Visual Basic. But that has not stopped Microsoft from energetically developing FoxPro. Version 3.0 was the first version for 32-bit Windows and introduced object-orientation and a new form designer. It also brought the trusty .DBF file format up to date, bringing in engine-level referential integrity, stored procedures and triggers.

Like Visual Basic, FoxPro is an interpreted language that comes with an integrated development environment offering various visual tools. VB is a general-purpose language to which has been added the database engine from Access and a third-party report designer.

By contrast, FoxPro was born and bred for databases and has its own database engine and its own report designer. It is the most capable of the desktop databases, with impressive query performance and the ability to handle larger amounts of data than VB or Access are happy with. This remark is based on the assumption that you are working with data in each product's native format. Both VB and FoxPro can also be used as clients for SQL databases, in which case these considerations do not apply.

For visual programming, FoxPro has some excellent features. Only Symantec's Visual Café rivals it for ease of creating and re-using native components. You simply create a visual class, using FoxPro's form designer, and



FoxPro lets you build visual classes and is an excellent way to re-use your code

install it as a custom component on the toolbar if you wish. The object orientation is thorough and complete, getting one up on VB by supporting inheritance. You can even subclass ActiveX components.

ActiveX support, in general, has been improved in version 5.0 although compatibility problems are not unknown. Visual FoxPro is a client for ActiveX controls and OLE automation. It is also an OLE automation server and can create VB-style OLE DLLs. If you are using Internet Information Server on Windows NT, you can have web pages call FoxPro through the Internet Server API, ISAPI. This is an effective way of publishing FoxPro data on the web. Another strong feature is remote automation, which lets you configure a FoxPro automation server so that client applications on the network can remotely control its OLE objects.

Visual FoxPro 5.0 does not merit a two-point jump in version numbers from 3.0. It is a much better product, but more because it represents what 3.0 should have been rather than by being innovative. For example, performance has been improved, forms load

more quickly and the memory footprint is less in the new version. The FoxPro language includes a SELECT -SQL command which supports left outer joins, correcting an annoying limitation. Support for Win32s has been dropped (no great loss as it never worked well). Another encouraging sign is that FoxPro's language reference is smaller (a modest 450 pages). Microsoft has designated huge numbers of old commands and functions as obsolete, included only for backwards compatibility. Pruning like this is essential for FoxPro's survival.

Visual FoxPro is an obvious choice for the most demanding local or small network databases where, for some reason, an SQL server is not wanted. That niche is not enough to give it a large market. It is a plausible solution for a much wider range of applications, including use as a client in an SQL-based installation. Unfortunately, several factors count against it. It is interpreted and demands a huge runtime library. The language is weakly typed and therefore more error-prone than VB or Delphi, for instance. It remains a hard product to learn. FoxPro developers should upgrade, but others will probably want to look elsewhere.

PCW Details

- Price** Around £380 (plus VAT)
- Contact** Microsoft 0345 002000
- Good Points** Visual Classes. Fast database engine.
- Bad Points** Hard to learn. xBase is past its prime.
- Conclusion** The best FoxPro yet, but the world is moving on.

★★★

Java - why and why not?

Java is extraordinary. Its most remarkable feature is the way it has captured the attention of the industry, provoking debate and an avalanche of literature.

There are three reasons for this. First, it is an attractive language and an easy migration for C++ programmers, yet simultaneously makes C++ look bloated and out of date. C++ is a hybrid language which adds object orientation to C but maintains backwards compatibility. By contrast, Java is entirely object orientated in its design. Second, Java is the language of the net, with cross-platform and security features which make it ideal for embedding applications into web pages. Third, because of its cross-platform prowess, Java has been embraced as a possible escape-route from Windows and Intel, becoming a focal point for anyone who would rather Microsoft were a little less successful.

If you are creating applets for web sites, Java is the only sensible choice. It is also worth considering for general development. For ease of use and learning, it falls somewhere between Visual Basic and C++.

As Symantec's Visual Café demonstrates, it is well suited to component-orientated development. Java looks likely to succeed in several areas: on the web, in network computers and in embedded systems. If you are programming for a cross-platform environment, or want to hedge your bets over whether Windows, Unix, OS/2, Mac OS or Java chips is the way of the future, it is a great solution.

There are also good reasons *not* to use Java. The language and tools are immature, although new releases like JDK 1.1, the Java Beans component model and updates to the Abstract Window Toolkit are making good many of the deficiencies. More fundamentally, there is an unavoidable cost to cross-platform solutions.

Currently, performance is a problem because Java's virtual machine cannot interpret code as fast as a natively compiled application can run. Developments like just-in-time compilers, full native code compilers and chips designed solely to run Java applications, mean that slow performance will

be overcome, but an additional snag is access to platform-specific features. You can extend Java with native methods, to program directly to the API of the host environment, but if you do so, the application will no longer be cross-platform.

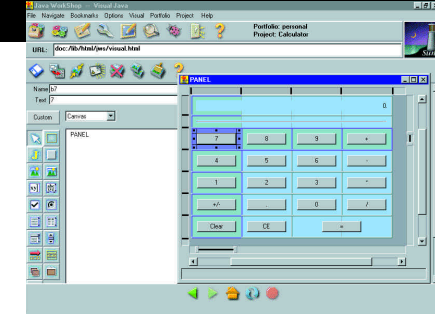
If you are creating applications for Windows, Java is hard to recommend. Other languages, like Visual Basic, C++ or Delphi give you full access to the formidable capabilities of Windows, with an API for everything from graphics to multimedia, to data access. The graphical form designers of these native tools are more sophisticated and easier to work with than Java designers, which need to take account of AWT layout managers and the fact that widgets such as buttons and list boxes do not look the same on every system. COM, the object model behind OLE and ActiveX, is evolving into a powerful system for sharing code between applications, across networks and on the internet. Java may be a nicer language but it will not be as productive or perform as well as those designed specifically for Windows.

Java Workshop

Sun owns Java, so you would expect it to produce leading-edge Java tools. Strangely, Java Workshop scores highly for innovation, but has so many rough edges it is hardly usable.

Java Workshop is written in Java. Each tool is an HTML page that contains an applet, including a project manager, editor, build manager, source browser, graphical layout designer and debugger. The pages are hosted in a customised browser which has the feel of a beta product even though this is version 1.0. The browser supports HTML 2.0, plus frames. Because Java currently has no support for printing, neither does Java Workshop, and the release notes suggest using Netscape for printing. Other notes urge you not to worry that the scroll bars don't work properly or that the background turns odd colours during use.

Using a browser for development has made it difficult for Sun to implement an elegant interface. One problem is that the layout window floats separately from the Visual Java page which contains the toolbox. It takes careful sizing and positioning of these windows to stop the layout from disappearing whenever you select a tool. A similar problem arises when you need to switch back and forth to select controls or edit attributes. As a visual programming environment it is several steps back from the likes of Visual Basic or Delphi in terms of ease of use and



Java Workshop is an impressive attempt at creating a development tool from applets, but falls short on both speed and usability

productivity. Another snag is that Sun has effectively patched the AWT library to make Visual Java work. You need to make 400Kb of supplementary classes available at runtime.

Despite the frustrations, there are benefits to the Java Workshop approach. The visual layout tool, despite its awkward interface, is superior to others in that it accurately reflects how the layout is handled by Java; other layout designers only approximate what you will see when the applet or application is run. Ease of testing applets is another benefit. It is just a matter of pointing the browser at the HTML container page helpfully generated for you. Access to documentation and source code is another strong point which, given that web browsers were created for accessing text, should not be surprising. Using JavaDoc, an application which automatically

documents Java source code, you can browse your own code and the Java runtime classes. Another benefit is team development. You can publish a project to make it available to either the web or your corporate intranet. Java Workshop also supports several version control systems for check-in and check-out of code.

You would have thought that Java Workshop would be browser-independent and that it would work on any Java virtual machine. Unfortunately, this is not yet the case. Java Workshop installs its own VM so it can only be used on Solaris or 32-bit Windows systems, and with its own embedded browser. Conceptually, Java Workshop is exciting and rings true. Its implementation is not appealing, though, partly because of the immaturity of Java.

PCW Details

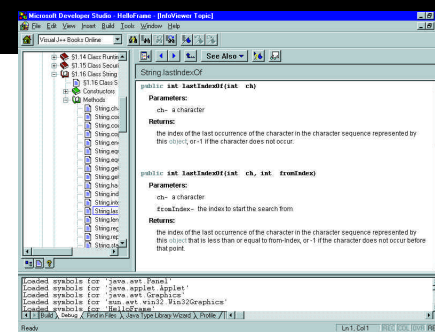
- Price** £79 (plus VAT)
- Contact** Sun 0181 880 8128
- Good Points** Built in Java, for Java. Great online help and source browsing.
- Bad Points** Slow. Not yet browser-independent. Rough edges.
- Conclusion** Fine concept, but wait for an improved version.

★★

Visual J++

The best thing about Microsoft's Java tool is the development environment. Visual J++ is hosted by Developer Studio, which has several nice features: most windows are dockable; online help is properly integrated, using Microsoft's Infoview application which handles huge amounts of documentation stored on hard disk or CD, organised into a tree view and displayed in a tidily-docked window; and it has an excellent search engine. Developer Studio makes good use of tabs. In one window you can tab between a class view of your project, a file view, or the online help tree. If you double-click a file name, a class or a method, the corresponding code opens in the appropriate editor. And, there is a great "find in files" feature. You can search for a string in a directory tree, have all the hits listed and double-click a file to open it in the editor.

All this shows that Microsoft has done a good job with integrating Java into the same environment as Visual C++. It also makes Visual J++ a good tool for banging out Java code. Microsoft's byte code compiler is fast, as is code execution with a just-in-time compiler. But there are problems with Visual J++. The biggest disappointment, bearing in mind the product's name, is the lack of visual design tools. Microsoft has not implemented a proper Java form designer. Instead, you are expected to use the Visual C++ resource editors to create a standard Windows



Visual J++ includes Infoview, an excellent implementation of online help

resource file. A wizard converts the resource into Java code, ignoring anything that Java cannot implement. Finally, you have to hand-edit the code to add event handlers and remember not to run the resource wizard again as it will overwrite your work. In comparison to the drag-and-drop visual design and component creation found in Visual Café, J++ looks weak.

Microsoft has enraged some members of the Java community by introducing extensions to the language. Visual J++ installs the Microsoft Virtual Machine, which is fully compliant with standard Java bytecode and also hooks into COM, the component model behind OLE and ActiveX. Java objects can be exposed as COM objects, and Java code can access COM objects. As a way of enabling Java to access the full riches of the Windows environment, this is a masterstroke. For

instance, J++ apps can make use of Data Access Objects, offering comprehensive database access. The price of using COM with Java is that platform independence is lost. But it is worse than that, as a J++ application or applet which uses COM will only work on the Microsoft Java Virtual Machine, not rival VMs. Another consequence is that Visual J++ requires Internet Explorer for debugging applets, since the debugger itself uses COM.

There is nothing sinister in what Microsoft has done with the Java Virtual Machine and J++. If you are happy to write Java apps that only run on 32-bit Windows, the COM features add significantly to Java's power. But most Java programmers want cross-platform capability, which is the prime reason for using Java.

PCW Details

- Price** around £75 (plus VAT)
- Contact** Microsoft 0345 002000
- Good Points** COM. Great coding environment and online help.
- Bad Points** Poor visual design tools. Using COM removes cross-platform compatibility.
- Conclusion** Good value if you like Visual C++, but not as good as Symantec's Java tools.

★★★

Jam tomorrow: what's in beta?

Here, we present a sneak preview of four development tools which are currently in beta form.

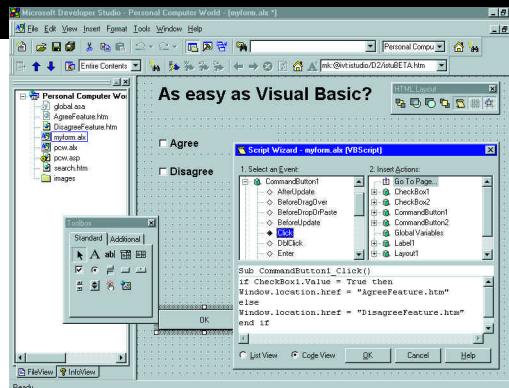
Visual InterDev

It was born as Blackbird, a tool for creating content on the Microsoft Network, which was then a closed bulletin board system. MSB (Microsoft Blackbird) got webbed and Microsoft brought out Front Page, a web site authoring tool which at first appeared to render Blackbird obsolete.

Only recently has the picture cleared and Blackbird has migrated to become first Internet Studio, and finally Visual InterDev. It is not for authoring web pages, but for creating web applications, or "weblications" in the new jargon. Just as the original Visual Basic made light work of Windows development, so Visual InterDev aims to simplify developing for the web.

The following comments are based on a Beta release of the product. Visual InterDev is hosted in Developer Studio, as used by Visual C++ and Visual J++. To run it, you need to have a live internet connection or else connect to a server on your network. It could be the supplied Personal Web Server, in which case you can do all your development on a single PC. When you start a project, Visual InterDev creates a new web on the server. To construct a web application, you work with several ingredients:

- HTML files: the web documents you know and love.
- ActiveX Layouts: forms which contain ActiveX controls, together with VB Script or JavaScript to drive the interface. These layouts are themselves ActiveX controls.
- Active Server Pages: special HTML pages that contain scripts which execute on the server.



Visual InterDev integrates the many elements which make up a web application, with the focus on ActiveX rather than Java

- A Global file: this contains event handlers so you can write code that executes at the beginning or end of user sessions with your web project.

- Media files: images, sounds, video in standard formats.

When you work on a project you will be adding and editing files using the tools which Visual InterDev provides, such as its colour-coded HTML editor and enhanced layout designer as well as any other tools you have available, such as Front Page for editing straightforward HTML pages. Visual InterDev supports Visual SourceSafe for team working. To run the application, there is no compilation required. All you need to do is navigate to a page on your site with Internet Explorer.

A major plus is easy development of database applications, using the Active Data Object and ODBC. Such work is assisted by design-time ActiveX controls which automatically generate data access scripts.

The main negative, at least in this release, is that there is no way to set breakpoints in VB scripts for debugging. This is one area in desperate need of improvement.

One pressing question is where Java fits into this environment. The truth is that it is incidental. Using Front Page or with hand-coded HTML you can insert a Java applet into a Visual InterDev project. You can also create ActiveX controls with J++ and include them that way. Java is supported, then, but the foundation of this product is COM, OLE, ActiveX or whatever you wish to call it.

That raises another question, which is whether Visual InterDev locks you into using Microsoft servers and Microsoft browsers. Strictly, it does not. There is nothing to stop third parties from implementing servers which support the ActiveX framework, the COM interface which drives the server-side features.

Equally, other browsers can support ActiveX, VB Script and the Microsoft Java Virtual Machine if they wish. Netscape has, in fact, announced ActiveX support, although on Windows 95 only. But other vendors will not rush to embrace Microsoft standards and in practice Visual InterDev is a development tool for Internet Information Server running on Windows NT, or perhaps the Personal Web Server on Windows 95. For the moment, it also needs Internet Explorer clients, unless you tread carefully to avoid certain features. It is still impressive, offering real Rapid Application Development for weblications.

Windows developers should embrace it, while those who treasure the cross-platform talents of the internet should stay well clear.

BETA

Visual Basic 5.0

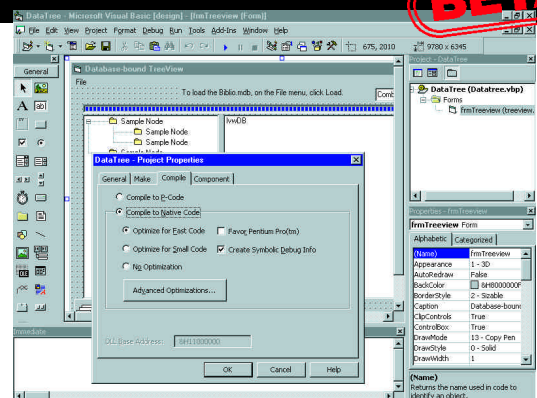
Judging by this beta version Visual Basic 5.0 is a must-have upgrade for 32-bit VB developers (there will not be a 16-bit version).

Performance has been substantially improved, thanks to a faster forms engine and a new option to compile to native code. It should be possible to build larger, more complex projects in VB without it slowing to a crawl.

The object model is better, supporting polymorphism thanks to a new "implements" keyword that allows multiple classes to implement the same interface. Although less intuitive than inheritance, it provides most of the same benefits. As you would expect, Microsoft has also improved VB's ActiveX features. You can create ActiveX controls and install them as components on the VB toolbar. Another new trick is exposing forms as active documents, which means your application can be hosted in a client

application such as Internet Explorer.

It is interesting to compare VB 5.0 with Borland's Delphi. Both have strong database features, but Visual Basic's Data Access Objects puts it slightly ahead. VB has better ActiveX features, although if you mistrust COM that will not be an advantage. Delphi is a little harder to learn, but its extensible Visual Component Library is more elegant than VB's pseudo object-orientation. Delphi has the edge on power with its ability, for example, to compile true Windows DLLs, intercept Windows messages and create owner-draw controls. Choose VB for its ease of use, its COM features, or its database talents. If those factors are not priorities,



Visual Basic 5.0 provides the long-awaited native code compilation, but the VB runtime DLLs are still required

Delphi remains the more satisfying choice.

- See our *First Impressions* section (p64) for a preview of Visual Basic 5.0.

BETA

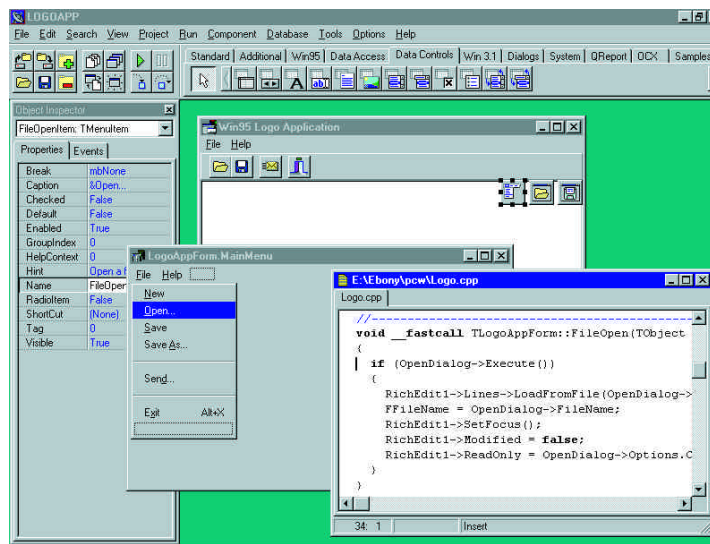
C++ Builder

BETA

Powersoft's Optima was the first to prove that C++ could be combined with a true visual programming environment. Now, Borland has implemented Delphi for C++, thereby stepping up the pressure on Microsoft to make Visual C++ easier to work with. In a nutshell, C++ Builder implements Delphi's Visual Component Library in C++, providing all the features of Delphi for C++ developers. Because C++ is more complex than Object Pascal, compilation takes a little longer, but it is still quick enough to do frequent test builds. You can also share Delphi and C++ components in one project, which will be useful for migrating from one to the other.

The database features of Delphi have been migrated along with the rest of the VCL, so a range of database components and data-aware controls are included.

■ See our *First Impressions* section (p64) for a preview of C++ Builder.



It looks like Delphi but the code is C++. Together with Optima, C++ Builder proves that visual programming and C++ can go together

Visual Café

BETA

In late beta at the time of writing, Visual Café looks like the Java tool to beat. Its predecessor, Symantec Café, has been the leading Java development product for some time.

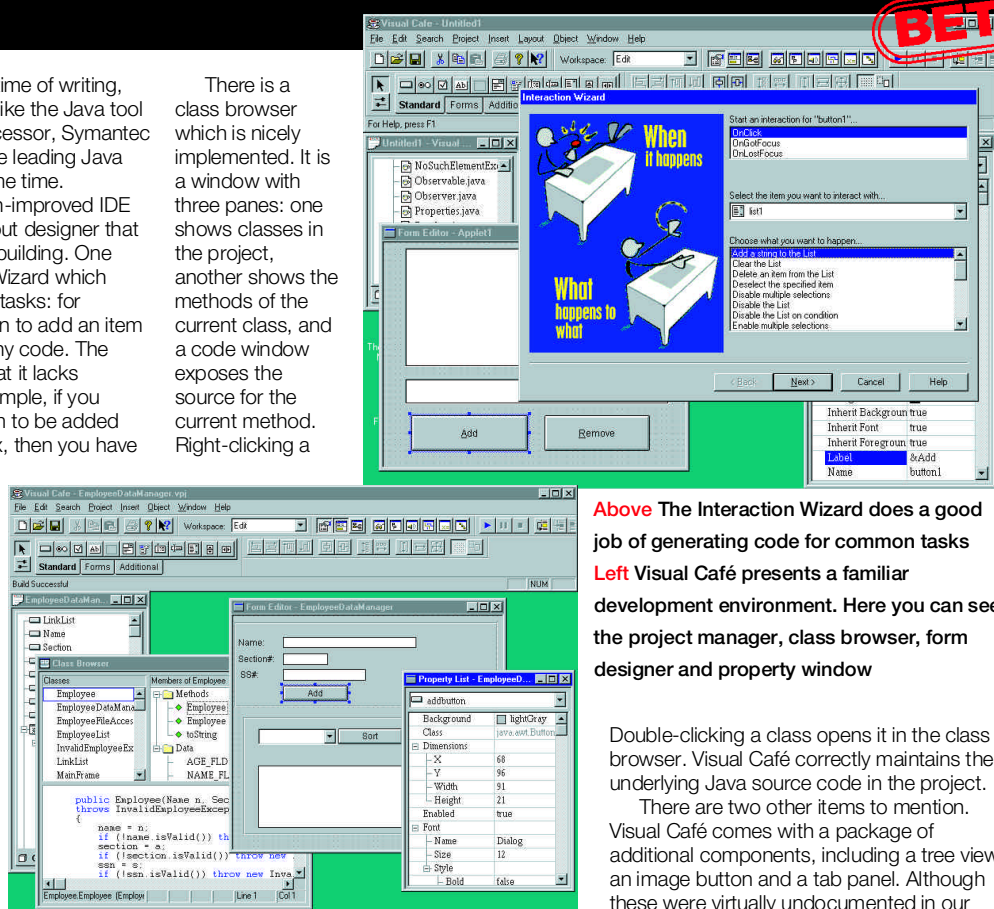
Visual Café sports a much-improved IDE together with a graphical layout designer that goes beyond mere interface building. One innovation is the Interaction Wizard which generates code for common tasks: for example, you can set a button to add an item to a list box without writing any code. The snag with this approach is that it lacks sophistication. Using this example, if you wanted to check that the item to be added was not already in the list box, then you have to manually edit the code. It

is not hard to do: select the button, right-click, and choose Edit source. It is important to be realistic about what the Interaction Wizard will and will not do for you.

Visual Café has several features which make it an outstanding visual development tool. One is the ease with which components can be created and re-used. The component library window displays all available components in a tree view.

To include one in a project, drag it across to a form or into your project window, which also shows its components in a tree view. Now let us say you customise the component, changing its appearance and adding some code. If you want to add it to the component library, simply drag it back to the library window — this is how components *ought* to work in a visual environment.

There is a class browser which is nicely implemented. It is a window with three panes: one shows classes in the project, another shows the methods of the current class, and a code window exposes the source for the current method. Right-clicking a method reveals a Goto Source option. You can insert new classes straight into the class browser. Another way of navigating and adding classes is by using the hierarchy editor which offers a graphical view of the relationships between classes in a project. You can use drag-and-drop to change these relationships or to create new classes.



Above The Interaction Wizard does a good job of generating code for common tasks
Left Visual Café presents a familiar development environment. Here you can see the project manager, class browser, form designer and property window

Double-clicking a class opens it in the class browser. Visual Café correctly maintains the underlying Java source code in the project.

There are two other items to mention. Visual Café comes with a package of additional components, including a tree view, an image button and a tab panel. Although these were virtually undocumented in our beta copy, they do look useful. Additionally, Symantec produces a Pro version of Visual Café which includes dbAnywhere, code which works with JDBC, the Java data access API, to link with desktop or server databases. There will be data-aware additions to the component library. It is an enticing prospect and should keep Symantec's Java development tools ahead of the pack.

Choose your object

■ Objects have won the day. Every product in this review has at least some claim to be object-orientated. Nevertheless, it is ironic that the most popular tool, Visual Basic, has the poorest OO credentials, with no support for inheritance. But all objects are not equal.

If your goal is to design and create applications using object-orientated code, then what counts is how each individual language implements objects and classes. For example, Java and Smalltalk are purer than C++ or Delphi, both of which allow you to mix object-orientated and procedural code. In this context, objects are internal to the application. You could build up a library of classes for re-use in future projects which use the same language, but if you switch to a different language such classes will no longer be useful. There is a way to overcome this limitation, by creating objects that are visible outside the confines of their own language.

Microsoft's ActiveX objects achieve this by making themselves available to the whole Windows environment. In theory, a correctly registered ActiveX component can be used by any ActiveX client or container. You could create an ActiveX control in Visual C++ and use it in Visual Basic, Delphi, or PowerBuilder. Distributed COM is an evolving improvement that enables you to create and control ActiveX objects across a network.

The weakness of ActiveX is the cross-platform aspect. Although Microsoft is encouraging implementations of ActiveX on Unix and on the Macintosh, the technology depends on components being compiled to

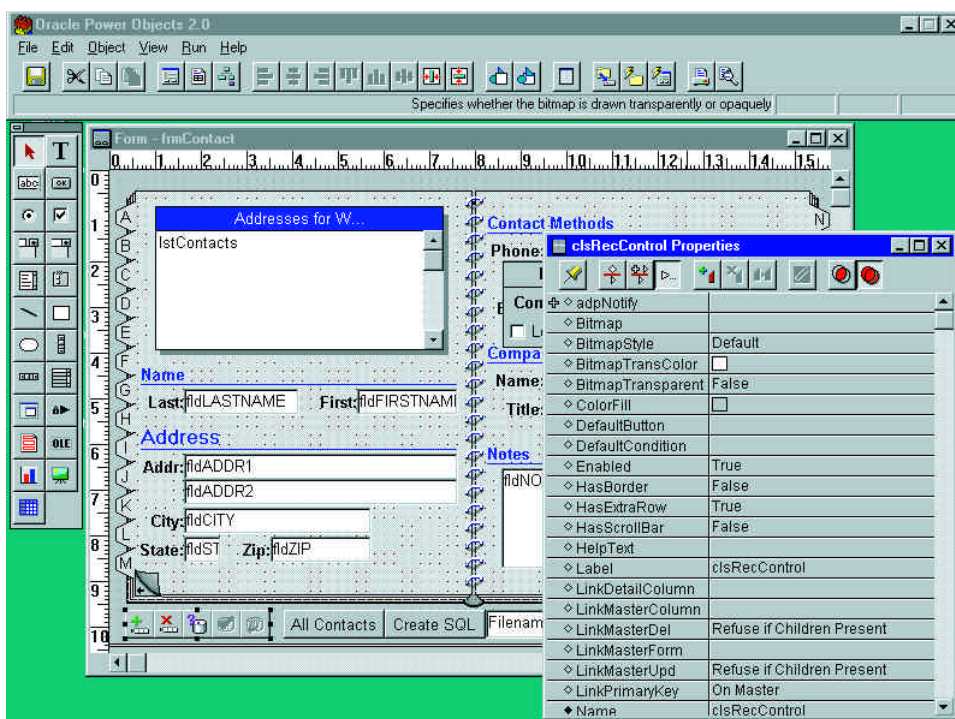
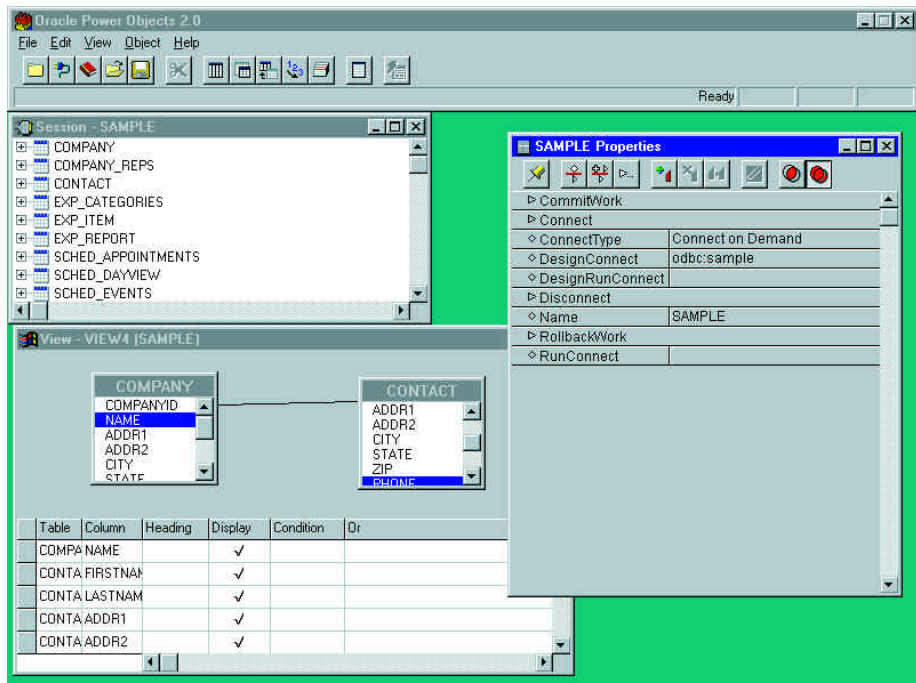
the native code of the platform on which they are running. For instance, imagine you were using an ActiveX control on a Windows web page. A user running Microsoft Internet Explorer 3.0 on an ActiveX-enabled Macintosh would not be able to see your control, unless you had gone to the lengths of obtaining a version compiled for the Mac and installed it alongside the Windows equivalent. This assumes a Mac version to be available, which is unlikely, and that it works in exactly the same way.

A way around this is to compile components to an intermediate format, byte code, which is executed by a virtual machine that interprets the code and converts it to native instructions. Microsoft seems to be moving in this direction, with the VB 5.0 runtime library now called the VB virtual machine. It seems plausible that this could be implemented on several platforms, giving true cross-platform components. It hardly seems necessary, though, because Java has done it already. A Java applet is a component that runs on any platform for which the Java virtual machine has been implemented.

The industry's wide adoption of Java makes it the obvious choice if cross-platform capability is important. There is no such thing as future-proof development, but Java is certainly the way to go if you want objects that work outside a Windows environment. Unfortunately the Java approach currently requires compromises in other areas (see the panel "Java — why and why not" on page 134).

Top The Power Objects session window holds tables and views, with methods for rollback and commit

Left The Power Objects property sheet shows properties and methods, including those defined by the user

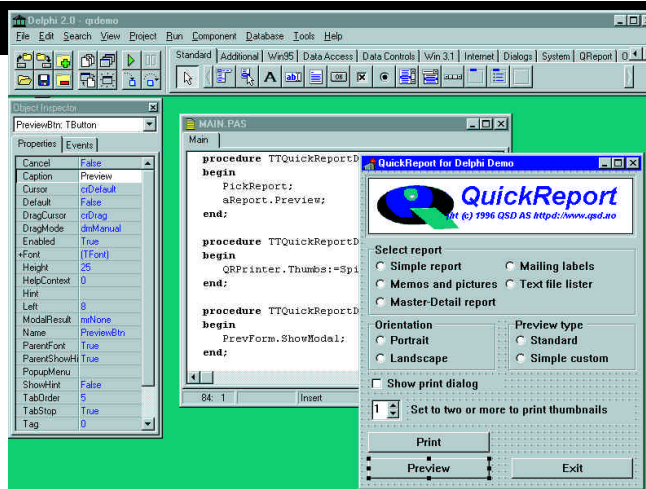




Editor's Choice

No longer do you have to choose between performance and ease of use when choosing a visual programming tool. The best products allow you to create simple applications easily, compile to native executables for performance without compromise, and give you all the power you need when it comes to cutting code. The package which best combines these features remains Borland's Delphi 2.0, which makes it our Editor's Choice.

The key advantages of Delphi are its speedy compiler, which allows frequent test builds and the easy extensibility of its visual component library. It is one of the few products in this round-up to be built in its own language, which may explain why it has such a complete and productive environment. Documentation remains poor, but Borland compensates by making the most of the source code available; a significant advantage for programmers. It fits reasonably well with ActiveX, with support for all its main features apart from control creation, but, unlike Microsoft's Visual Basic, is not wholly dependent on it. Delphi's least convincing aspects are its poor report designer and weak



Borland's Delphi remains the best all-round visual programming tool

links to ODBC, but the language is sufficiently flexible that you can work around these shortcomings.

Close behind Delphi is a new contender, Powersoft's Optima++, which is our Highly Commended product in this review. Unlike Delphi, its ODBC support is first class. It also has the advantage of an industry-standard language, ANSI-compatible C++. Optima comes with a good SQL database, SQL Anywhere, and in its Professional and Enterprise versions incorporates the datawindow from PowerBuilder, tapping into

a fast and powerful visual database tool. Unlike PowerBuilder, Optima++ is well-suited to general purpose development and has an industry-standard language. It almost pulls ahead of Delphi except that it lacks an object-orientated way of extending its component library and proved less robust than Delphi in our testing. Optima is in its early days, though, so watch for improvements.

These products may not be the best for you, personally, though. When choosing a visual programming tool, our recommendation is to first establish satisfactory database

performance before worrying about the interface design. Tightly focused products like PowerBuilder or Power Objects come into their own when the fit is good. By contrast, if the engine doesn't work, a pretty container will not redeem it.

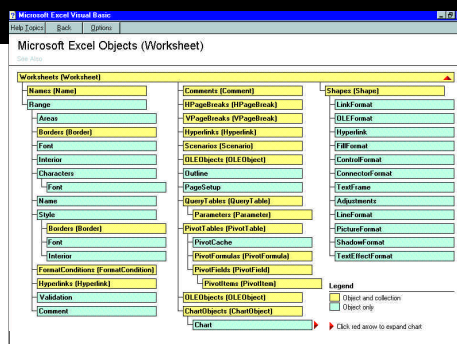
And finally, what about Java? In the context of a web-connected, cross-platform environment, it is unbeatable. Both the language and the tools are developing fast and performance is improving. If your focus is Windows, though, Java is not yet a sensible choice.

Microsoft Office 97

Office 97 has advanced to the point where it deserves to be considered as an application development tool in its own right. Office 97 has standardised Visual Basic for Applications, which appears in the same development environment wherever it is called. This includes the form designer, the heart of VB, so that VBA in Office is virtually the same as the full version but without the ability to build standalone executables.

Developing in Office requires a shift in perspective. Instead of thinking in terms of three or four main applications, each with a macro language, you need to see Office as a collection of programmable components. For example, Word 97 has objects representing documents, paragraphs, bookmarks, drawing shapes, and many more. Programming these objects through OLE automation, now also known as ActiveX automation, gives a fine degree of control over everything that happens in Word. Objects also raise events, so you can write code to respond to them. Word document templates have a New, Open and Close event. Excel has a richer event model, including a change event which fires each time a cell value is altered, which means you can create custom routines to validate data as it is entered.

Forms in Visual Basic for Applications are portable between VBA and the full VB 5.0. That should come as no surprise, since the two environments are virtually the same. Naturally, you can use ActiveX components on



Object models, like this one for Excel worksheets, show how Office applications break down into programmable components

these forms. VBA can also talk to databases using the same data access objects as found in VB, Visual J++ and Visual C++. This includes security, transactions, and access to ODBC data sources as well as desktop databases. Another twist is that Office documents can contain ActiveX objects. For example, you could place a calendar control on an Excel sheet and double-click to open the VB editor and write code to respond to clicks, date changes and so on.

Office Development makes good sense when you have users who are already working with Office each day; it lets you build on existing skills with custom functionality. It should never be necessary, for instance, to open a database application to find an

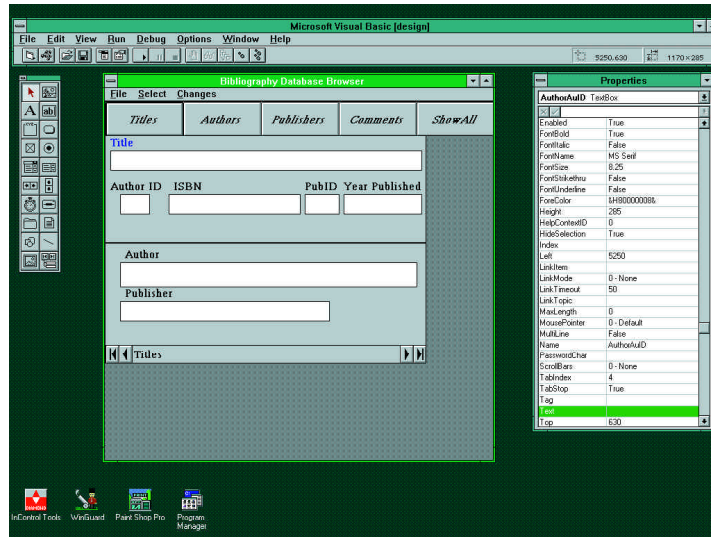
address when typing a letter. That sort of task can be integrated into Word. Another idea is to create dynamic documents which behave like reports, automatically updating figures and charts by linking to a database. The user can either run the application from a menu or toolbar in Word, or simply by opening a document.

There are several disadvantages, too. It is the opposite of efficient programming, automating huge Office applications instead of writing lean code for a specific purpose. You can think of Office as a large runtime library, one that is particularly expensive to distribute. Performance may also be a problem. Systems that are short of memory will struggle, with perhaps 16Mb a realistic minimum or 32Mb for comfort. Although Visual Basic 5.0 has a compiler, it is not available for VBA, so code-intensive applications may be slow. The main worry, though, is ActiveX itself. In our experience ActiveX automation is fairly robust yet ActiveX controls often cause problems: they are not as universally compatible as they should be, badly written controls may crash your application, and new versions installed by other programs may cause your solution to fail. The only answer is careful control over what users install on their systems, which is not easy when simply accessing a web page might cause a new ActiveX component to be installed. To be fair, though, this last factor is not unique to Office 97, but applies to all ActiveX-based applications.

What about Windows 3.1?

Despite the massive hype, there are enormous numbers of PCs out there running Windows 3.1 or Windows for Workgroups. Many companies and users are reluctant to change, either because their hardware is not up to the job or because the risks of moving from a known, working configuration are too great. These sites need supporting, and there is still a strong market for 16-bit Windows solutions. If that is the platform you need to support, your development choices are limited. Many new tools need Windows 95 or NT, and Microsoft has all but abandoned the old Windows. There are still good tools around, though, so here are some key contenders:

1. **Visual Basic 4.0** includes a 16-bit version, although VB 5.0 will not. VB 3.0 is still a great 16-bit tool and more lightweight than version 4.0.
2. **Visual C++ 1.52**, the last 16-bit version, is still included in the Visual C++ subscription. Version 4.0 supports Win32s, the libraries which give 16-bit Windows limited 32-bit compatibility, but the later 4.x releases do not.
3. **Borland C++ 5.0** needs Windows 95 or NT to run, but targets DOS, 16- or 32-bit



Despite the mass move to Windows 95, Visual Basic 4.0 for Windows 3.11 is still being widely used

Windows. This is the most flexible choice for handling all varieties of Windows.

4. **Borland Delphi 1.0** is outstanding for 16-bit Windows development. It comes in the box with Delphi 2.0.

5. **Sybase Powerbuilder 5.0** supports Windows 3.x.

6. **Visual dBase 5.5** is a 16-bit product.
7. **Oracle Power Objects** targets all versions of Windows.

Table of Features

Product	Java Workshop	Visual J++	Delphi 2.0	Optima ++ 1.5	Power Objects 2.0
Contact	Sun 0181 880 8128	Microsoft 0345 002000	Borland 0800 454065	Powersoft 01494 555555	Oracle 0118 924 0000
Price (excl. VAT)	£79	£75	£69 - £1,275	£139 - £1,350	£250 - £1,250
Target platforms	Java	Java	Windows 95/NT	Windows 95, NT, Win32s	Windows 3.1, 95, NT, Power Macintosh
ActiveX Client	N/A	●	●	●	●
Create ActiveX components	N/A	●	○	○	○
OLE automation client	N/A	N/A	●	●	○
OLE automation server	N/A	N/A	●	○	●
Create native components	●	●	●	○	●
Native code generation	N/A	○	●	●	○
Database connectivity	JDBC	DAO (OLE)	Native drivers and ODBC	ODBC	ODBC, Oracle 7
Supplied database	None	None	Local Interbase	SQL Anywhere	Oracle Lite
Report design	○	N/A	ReportSmith	DataWindow	Crystal Reports
Version control	PVCS, PCS or SCCS	Visual SourceSafe	PVCS	ObjectCycle	None

Product	PowerBuilder 5.0	VisualAge Basic	Visual Basic 4.0	Visual C++ 4.2	Visual FoxPro 5.0
Contact	Powersoft 01494 555555	IBM 01256 343000	Microsoft 0345 002000	Microsoft 0345 002000	Microsoft 0345 002000
Price (excl. VAT)	£195 - £3,295	£80	£79 - £745	£390 (subscription)	£380
Target platforms	Windows 3.1, 95, NT, Macintosh, Unix	OS/2, Windows 95/NT	Windows 3.1, 95, NT	Windows 95/NT	Windows 95/NT
ActiveX Client	●	●	●	●	●
Create ActiveX components	○	○	○	●	○
OLE automation client	●	●	●	●	●
OLE automation server	●	○	●	●	●
Create native components	●	●	○	●	●
Native code generation	●	○	○	●	○
Database connectivity	Native drivers and ODBC	ODBC, DB2	JET, ODBC	DAO, ODBC	Native DBF, ODBC
Supplied database	SQL Anywhere	None	JET	JET	Native
Report design	DataWindow	None	Crystal Reports	Crystal Reports	Native
Version control	ObjectCycle	None	Visual SourceSafe	Visual SourceSafe	Visual SourceSafe

Key: ● Yes ○ No

PCW Awards 1997

Your chance to vote in the seventh annual Personal Computer World Awards and win a super Sony Mini Hi-Fi and £100 of Virgin vouchers in the PCW Reader Awards.

The Sony system features CD player, dual tape decks, FM tuner, 30W super-woofer and full remote control. One lucky person will win this fantastic prize when the draw is made from all entries received by 25th April 1997. Fifteen runners-up will receive £50 Virgin vouchers.

The Personal Computer World Awards are about rewarding excellence and attention to service. The categories this year cover the industry like never before, with new awards for Hardware, Software and an extended list of Online Awards, reflecting the growing importance of the internet in business and home computing.

And your votes really count. We want to know which companies out there are supplying you with the type of service you'd want to recommend to someone else. We have split the Reader Awards into nine categories, in an attempt to cover the areas of service and reliability that affect you. The Reader Awards are decided solely by you, and are highly valued by the companies advertising in the pages of Personal Computer World.

In the other categories, your nominations are discussed by an expert panel of judges (see left) to produce a winner and two runners-up.

To make sure you are in with a chance of winning, fill in the categories on the form facing this page, tear it out, fold along the dotted lines and pop it in the postbox. We'll even pay the postage!

Vote on the Web

This year for the first time you can vote via the internet. Just go to www.pcw.vnu.co.uk and follow the link to the online voting form.

The publisher of *Personal Computer World*, VNU Business Publications, will donate 20p to Oxfam's International Appeal Fund for every entry sent in. So, the more of you that enter, the more money VNU will be able to give to Oxfam.



PCW Judging panel

- Ben Tisdall Group Editor
- PJ Fisher Managing Editor
- Clive Akass News Editor
- Gordon Laing Features Editor
- Eleanor Turton-Hill Technical Editor
- Adele Dyer Reviews Editor
- Simon Rockman Associate Editor
- Dylan Armbrust Senior Staff Writer
- Adam Evans Staff Writer
- Lynley Oram Staff Writer

PCW Technical Writers

- Mark Baynes
- Terence Green
- Tim Nott
- Tim Anderson
- Paul Begg
- Mark Whitehorn
- Roger Gann
- Nigel Whitfield

VNU European Labs Judging Panel

- Wisse Hettinga European Labs Manager
- George MacDonald Labs Manager
- Jonathan Ricks Labs Testing Editor

Awards categories

Fill in as many categories as you want, fold the form and post it. That's all you have to do to take part in the 1997 PCW Awards.

Reader Awards

1	Best high-street retailer
2	Best software dealer
3	Best hardware dealer
4	Best PC supplier (mail order)
5	Best hardware telephone support
6	Best software telephone support
7	Best on-site maintenance
8	Most reliable PC
9	Best advertisement

Hardware awards

10	Most innovative hardware
11	Best PC system for business
12	Best PC for the home
13	Best notebook
14	Best laser
15	Best budget laser — under £350
16	Best inkjet
17	Best budget inkjet — under £300
18	Best modem
19	Best graphics card
20	Best gadget
21	Best handheld/palmtop

Software awards

22	Most innovative software
23	Best software suite
24	Best software application (excluding suites)
25	Best creative software
26	Best internet browser
27	Best utility
28	Best CD-ROM reference title
29	Best CD-ROM kids title
30	Best game

Online awards

31	Best Internet Service Provider (ISP)
32	Best content provider (not including ISPs)
33	Best UK web site
34	Best web site on the internet
35	Best use of interactivity on a web site

Your details

Name _____ Job Title _____
 Company _____
 Address _____
 Telephone _____ Postcode _____
 Fax _____
 The closing date for nominations is 25th April 1997 Please tick box if you do not wish to receive promotional material.



Above The Diba financial assistant prototype

Popular culture

The Diba brothers view PCs as a niche market, and they are designing appliances which could sell in their billions. Clive Akass talks to Farid Dibachi.

The significance of the network computer (NC) has remained elusive since Oracle chief, Larry Ellison, relaunched the idea in 1995. (NCs in the form of dumb terminals have, of course, been around since pre-PC days.) Ellison saw the network computer primarily as a way to break the PC's hold on big business systems; yet few people outside corporate boardrooms and IT departments really care enough about the network computer's low running costs and ease of administration to energise the kind of passionate debate we have seen during the past few months. The real paradigm shift was surely an

overturning of the notion that software must be tailored to hardware: an NC can use any hardware provided it is tailored to talk TCP/IP and run Java-portable programs.

This cheerful promiscuity certainly unshackled the industry from the PC architecture. It also suited, perfectly well, the free-for-all of the burgeoning internet — and a mature internet market will dwarf even that of the big-spending corporates.

So did Ellison miss the point? Could it be that the famous big-mouth did not talk big enough? Some believe so, including two brothers who were in on the NC's early days at Oracle.

Farid and Farzad Dibachi dropped everything to found a company called Diba which would develop cheap information appliances, as easy to use as a light switch and designed to handle specific tasks like fetching and sending email, or displaying maps, or menus. These were devices the brothers thought might sell not in tens of thousands like business systems, nor even in tens of millions like PCs, but in billions, like shoes.

The Dibachis, with their parents, emigrated to the United States from Iran in 1978 when Farid was 16 and Farzad was 14. Farid spent seven years at Hewlett-Packard and three at Analogic before starting his own company called Wavetron, developing digital signal processing solutions. In 1995, his brother Farzad was senior vice-president of Oracle's New Media division, reporting directly to Ellison.

Farid admits that brainstorming with Ellison about the network computer crystallised their own ideas. "Farzad would often tap in to me for technology answers," Farid told me at Diba's headquarters at Menlo Park, in the heart of Silicon Valley. "He called me up one Sunday and said: 'Larry and me have been talking about putting together a little low-cost device he calls a network computer', and gave me a bit of background on the things Larry was doing.

"I said to him: 'Let me think about it a bit and I'll fax you something.' So I faxed him a back-of-the-envelope sketch of how you could put this thing together and it generated quite a bit of interest and excitement, particularly with Larry. So the next day I was in Larry's house...and we talked about how we could put these things together."

It soon became apparent that Larry Ellison had a second agenda, which was to topple the Microsoft-Intel duopoly that had dominated the PC business for two decades, and grab a slice of the action for himself.

The Dibachi brothers had different ideas. "We had a view of enabling, say, mum and dad to get on to the



"My eyes are on the 5.2 billion people in the world, not the 150 million users of the PC. I want to go after those people who can't afford a PC..."

internet, or to be able to get information easily. Talking about [the NC with Ellison], it sounded very exciting...But as we got into it — you know, two or three weeks into it — it became apparent that this guy was in a totally different kind of space."

Ellison succeeded at least in opening people's minds to the fact that the PC is not the be-all and end-all of devices. "That was good for us when we started," said Farid. "What he has done wrong, in my opinion, is that he's so focused on his underlying agenda that he's missing out on a much bigger pie, which is the consumer at large."

The brothers decided to start afresh. Farid left Oracle and Farzad sold off Wavetron to set up Diba at the end of 1995. They were not interested in superseding the PC, even if that were possible or desirable — like all of us, Farid likes PCs. "My eyes are on the 5.2 billion people in the world, not the 150 million users of the PC," he said. "I

want to go after those people who can't afford a PC, or find one difficult to use, or who just can't carry one from the store to their cars. [The PC] is a clumsy engineer-to-

Above A set-top box and remote control for a web TV

Pictured, left Farid Dibachi emigrated from Iran in 1978 and eventually started his own company, Wavetron, before joining with his brother Farzad to launch Diba in 1995. Farid is chief technical officer and chairman of the company

engineer device that only the technically savvy know how to buy, sell, or use."

Diba sells proto-products rather than products: core technology (a hardware reference design and an application programming interface) around which devices costing between \$100 and \$500 can be built. Some 95 percent of the technology needed to web-enable a phone is identical to that required for a TV, Farid said. Diba sells that common 95 percent. Client manufacturers are given "an application surface area so they can add the five percent or so to allow a specific consumer to do a specific function, and do it extremely easily."

This software surface sits in flash memory, so that it can be upgraded painlessly if necessary, when plugged into the net. It runs Java and so is technically an NC.

Diba is by no means the only company working in this field but it has stoked up a lot of credibility in just over a year of operation. Panasonic is using Diba technology for a webphone, Proxima for a web-enabled projector, and Samsung and Zenith for web TVs. NEC is to build Diba appliances around its V830 chip and, just before Christmas, Mitsubishi announced a partnership to develop \$200 appliances around its own RISC chipset. These latter appliances could become cheaper still by integrating the technology into a single chip. Diba has also opened a European branch at Reading under Nigel



Left
The webphone will enable mail to be picked up or sent at the click of a button

Mass-market appeal

Plug-in-and-go information appliances targeted at a mass market are likely to get very cheap as the technology becomes concentrated into single chips; others could be luxury items. Diba designs include:

- A slick wallet device which will include personal finance software and will provide direct control over your bank account (see page 156).
- A fairly conventional application is the set-top box and remote control for a web TV (page 157). Diba developed sophisticated software to render web fonts readable on relatively low-definition TV screens.
- The black device shown below is an electronic Yellow Pages: one of the ways in which the web will eventually transform the way we do business.
- The webphone (*below*) is designed to turn granny on to email. Service provider details are built in, so mail can be picked up or sent at the click of a button.
- The recipe book is designed to fit under a kitchen shelf. Similar devices could be used in garages or repair shops to provide technical information.

Seed, former head of Silicon Graphics UK.

Farid admits that Diba faces a chicken-and-egg problem. The web still lacks the content (to say nothing of the bandwidth) to sustain a mass market, and hence mass sales of web appliances. Yet it won't get the content until it gets the users.

He reckons the easier it is to get netted, the more users there will be and the better the content. "It's like with TV. The more TVs that are out there, the more exciting the TV programmes." He cites the example of answering machines, which have been around for about

25 years but have become truly ubiquitous only over the past five or six. "Devices like this, especially when you go after the consumer, almost require socio-psychological changes, and socio-psychological changes come about in 10- to 15-year increments."

He says Diba's initial goals would be met with, say, five million users worldwide at \$10 each in royalties. "That makes Diba into a \$50 million company, one or two years into its life. But the reason we got into this is not to get five million or ten million people excited. We have got to get literally billions of people excited."

Clearly Ellison's Californian bigtalk is catching, but Silicon Valley is accustomed to seeing the wildest of dreams realised. Diba's chief operating officer, Joe Gillach, is on record as having said: "We'll be nothing in a few years' time, or we'll be worth billions." ■



One of the fleet, Global Teamwork, is sponsored by GPT, Nortel and Ericsson

Crest of a wave

Simon Vail looks at how technology aids communication and navigation in the BT Global Challenge yacht race, and why the IT industry is a keen supporter.

In October 1970 a 30-year-old ex-paratrooper began a solo voyage around the world — one which critics claimed could not be completed. Chay Blyth took 292 days to circumnavigate the globe *against* the prevailing winds and tides, in his 59-foot ketch, British Steel. Now, 26 years later, he has given armchair sailors a second chance to prove that anybody can sail around the world, as long as they have a spare year in their life and £18,750.

Blyth has amply demonstrated that people want risk and adventure, and are prepared to pay for it. In 1989 he took on the yachting establishment when he announced his intention to create a race that would take ordinary people, on a fleet of steel yachts, across the world's roughest seas.

The 1992 British Steel Challenge proved that amateur crews could sail ten ocean-going yachts 30,000 miles around the world. Four years later, with another four

boats added to the fleet, the BT Global Challenge has proved just as attractive a challenge for a wide cross-section of people who want to sail in the wake of Chay Blyth. And there is already a waiting list for the next race, set for the year 2000.

Sponsors ahoy!

The 1996 race started from Southampton in September, sailed to Rio, and completed its second leg of 7,000 miles to Wellington, New Zealand, in early January. A short sprint race between Wellington and Sydney follows, with the feared Sydney to Cape Town leg of 6,300 miles across the Southern Ocean taking place in March. Cape Town to Boston follows in May, with the final leg back across the Atlantic to Southampton finishing in June.

The race bears Blyth's stamp throughout: each boat is identical down to the last screw and can only be distinguished by the skill and dedication of their crews. A

professional skipper, hired by Blyth's company, The Challenge Business, is responsible for their safe return.

These boats are not for the blazer and pink gin brigade. Although the crews are spared the sweaty intimacy of "hot bunking" (when racing boats carry fewer bunks than there are crew members), the crew bunks are more akin to canvas slings than comfortable beds. Only two boxes of personal gear are allowed and skippers have set their own stringent requirements to cut down on weight; one even sawed the crew's tooth brushes in half!

Chay Blyth's determination to create an event in which crew morale and pure grit decide the winning boats, is reflected in the sponsorship rules. Major ocean yacht racing events like the BT Global Challenge have a reputation for making huge funding demands on sponsors. Yet Blyth insists that all the sponsors pay the same amount: £440,000 per boat and no more.

The IT industry has proved a keen supporter of the race, with BT as the principal sponsor and its deputy chairman, Dr Alan Rudge, set to take part as a crew member on the sprint leg from Wellington to Sydney. Toshiba, 3Com and Motorola have sponsored boats to bear their names. BT and MCI are sponsoring "Concert" and there's a similar joint effort from Amdahl, Hewlett-Packard, Sun Microsystems, Tandem, and Oracle. Telecommunications companies GPT, Nortel and Ericsson are backing "Global Teamwork".

Charting progress

Global Teamwork had a less than glorious start. She was penalised for crossing the start line ten seconds early and had to sit out the miserable English Channel weather for an hour, watching her competitors sailing over the horizon. Yet early on in the second leg, she took the lead.

For sponsorship manager, Edward Scott, the uncertainties of racing are part of the attraction. The consortium, each of which is splitting the sponsorship costs equally, grew out of Alan Rudge's enthusiasm for sailing: he and other IT executives had trained and raced for the Fastnet race, and decided that the BT Global Challenge race was an ideal way of combining business with pleasure. The race is being keenly followed by the sponsors. "On most legs we have a company employee, including the BT deputy chairman, actually taking part," says Scott.

Toshiba's general manager of corporate marketing, John Hill, says its entry, "Toshiba Wave Challenger", will be the company's major sponsorship item for the next two years. "The race is all about helping ordinary people to do extraordinary things. Being associated with such an event not only allows us to put our technology to practical use, but is also an ideal vehicle to assist Toshiba with global communications," says Hill. Each boat is equipped with two Toshiba laptops, a mono T2100 and a colour T2130C. The mono laptop forms an essential part of the boat's safety and communication equipment. It allows direct telex and fax communication, between other boats and the Southampton race office, anywhere in the world (see the panel, "Tracking by satellite", p164).

The colour laptop is linked to each boat's two Global Positioning Systems (GPS) which allow the crew to accurately plot the position of their boat (to within 300 metres) on Navmaster navigational charting software run on one of the laptops. Navmaster software is used to help skippers plan their races, using computerised charts supplied by the Admiralty Hydrographics Office and held on hard disk. The laptop also runs PC Weather Fax for Windows which converts weather forecasts into sharp, on-screen images which can be enlarged with the keyboard. It is connected to an Oki dot matrix printer, chosen because its printhead and roll of paper seem best able to cope with the damp.

Toshiba Wave Warrior's 28-year-old skipper, Simon Walker, is the youngest skipper in the fleet. He crewed on the yacht Rhone Poulenc in the 1992 race and although laptops were carried, they did not have computerised maps. Paper charts were restricted because of weight and bulk: "We had to call in on the Falkland Islands because of damage. We had a chart of the Islands, which are the size of Wales, but our map was a small chart; only A4. It wasn't really adequate," he recalls. This time, the boats can call up a detailed chart of any port or safe haven they might need to enter in an emergency. They can update the computerised charts with new information received at each harbour. "This has a huge safety implication for us and means that we don't have the tedium of having to update charts by hand," says Walker.

Batten down the hatches

Although the laptops have become an indispensable part of daily life on board, in practice they are not as easy to use as the conventional yachting instrumentation also carried on the boats. GPS and radar systems are mounted securely round the yacht's chart table, yet the laptops are stored in a cupboard in the galley. They are bolted to a shelf with steel clamps and the race rules prevent them from being moved. The steel clamps carry a security seal that must not be broken unless specific permission has been given by headquarters.

The laptops have a detachable keyboard but when the boat is heeled over, the crew member must wedge himself against the galley walls and kneel or crouch on the galley seat. The steel clamps are needed to hold the laptops steady. "You get huge G-forces on the yacht that occasionally upset the hard drives," says Walker. "It is not inconceivable that the yacht could jump off a wave and crash down 40 feet while that hard drive is writing."

The laptops stood up well to the first leg despite the vibration and damp conditions. Two were swapped at Rio: one with an unexplained fault and the second suffering from water drips. The Challenge Business project director, Andy Roberts, says that a sudden squall blew up over the yacht "Pause to Remember". All the boat's vents and hatches were open as the yacht was crossing the hot, sticky, Tropics. A member of the crew forgot to close the hatches and water dripped down the side of the boat and onto the laptop. Subsequently, a second laptop suffered the same fate on leaving Rio.

p164 ➤

Tracking by satellite



The race yachts use a mix of satellite and radio communications equipment to meet all their telephone and messaging needs. The boats carry an Inmarsat-C terminal which is used to transmit and receive messages. C-Sat software can also transmit messages direct to the Falmouth Coastguard (via Goonhilly Downs) or other search-and-rescue services around the world.

Every six hours, the GPS within C-Sat calculates the yacht's latitude and longitude and transmits the data via the yacht's transceiver and Inmarsat geostationary satellites to race HQ in Southampton. Race HQ can adjust the data transmission interval so that they know exactly where all the boats are, and may do this at the start of races when the boats are likely to be closely bunched. HQ can also poll any boat at any time to find out where it is by activating its transceiver.

BT has developed a race results system, so that anybody dialling into the Global Challenge web site can find out the latest position of the boats and read the crews' reports sent from the oceans of the world. The web site includes a virtual race, where internet sailors can compete in an electronic version of Global Challenge. The site is at www.btchallenge.com.

The clamps holding the laptops in the galley cupboard have an additional function. They position the laptops in such a way that the floppy drives are *not* accessible. No other software, apart from the agreed list (which includes Microsoft Works) can be carried or loaded during the voyage. If a laptop does need to be rebooted, special permission is needed from race HQ. "It is the only safe way there is for making sure that people are not interfering with the systems," says Simon Walker.

Sophisticated tactical racing software, which compares a yacht's progress through the water against a theoretical model of its best speed, is specifically banned, as are private weather forecasts from sponsors. The skippers can use any publicly broadcast weather information from weather stations around the world, in addition to the regular race forecasts from the Met Office.

Andy Roberts says although there are strict rules about the software that can be carried, there is nothing to stop crew members developing systems on board if they have the determination to work at the keyboard squashed into a corner while other crew members eat at the galley table. The spreadsheet in Microsoft Works was developed by one of the crews in the last race to form a crude but effective way of comparing their speed with the

yacht's performance data, which all the boats may carry as paper information. The laptops are also used to keep track of the 3,000 items carried on the boat and the freeze-dried rations needed to feed a 14-strong crew.

...and now for the weather

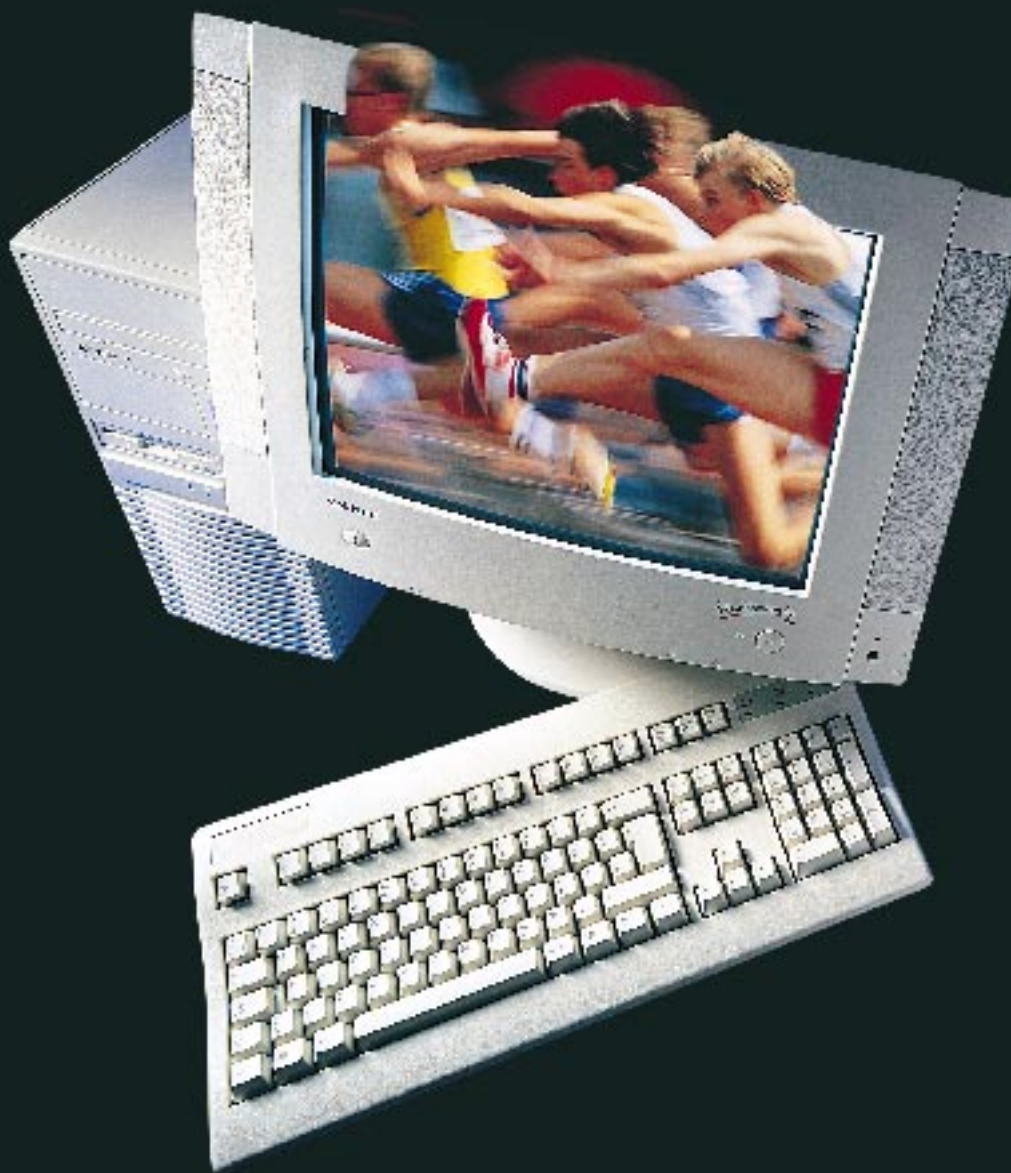
Two of the boats transmit data back to the UK. One of them, "Toshiba Wave Warrior", is transmitting wind speed and direction, barometric pressure, seawater temperature and depth of water under her keel using BPI Communications' Scada (Supervisory Control and Data Acquisition) remote monitoring system. The data is collected from yacht instrumentation and sent, via the on-board Inmarsat C satellite communication transceiver, to BT's land earth station at Goonhilly, Cornwall. The data is then forwarded via a PSTN link into C-Trak, BPI's control and monitoring software, and displayed in a Comsoft database at Comsoft's HQ. It is used to help compile the regular weather forecast reports from Bracknell.

"We would have liked the systems on every boat but they are quite expensive," says Roberts. "It would have been quite fascinating from a weather point of view to have detailed weather information from 14 boats spread over quite a wide area of remote ocean." A second boat, "Courtaulds International", is carrying the same remote monitoring system but linked up to the yacht's auxiliary engine. The "donkey" engine drives a generator which charges the boat's batteries and the water-making, or desalination, unit. "We are interested in discovering more about generator usage in these conditions," says Paul Oswald, marine business manager at VarityPerkins, the supplier of the donkey engine and the main engine used to power the boat when it is manoeuvring in harbour.

Every day, for two or three hours, the remote monitoring system transmits the temperature of the water jacket, oil pressure and operating hours of the auxiliary engine back to VarityPerkins' HQ in Peterborough. The system also logs all auxiliary engine operating data that can be downloaded at the end of each leg. "What we are able to do with the satellite engine information is plot it against other known weather conditions and the course of the boat. We can see what is happening to the engine when a Force 9 gale is blowing on the port quarter: it is quite dramatic how much it varies between one tack and another, or with following winds," says Oswald.

Despite all the high-tech equipment carried on board, the race will be won by the crew that works best together. Toshiba Wave Warrior's skipper, Simon Walker, who came second on the Southampton to Rio leg, claims the race is won at night when crews are, naturally, at their lowest ebb: a crew which can be motivated to change the sails yet again, when it is pitch black with the wind screaming and the waves breaking in all directions, will win the contest. As for faith in computers and GPS, each boat must carry a sextant and their skippers are required, under the terms of their Challenge Business contracts, to know how to use them. ■

MMX marks the spot



On the 8th of January Intel launched the new Pentium Processor with MMX Technology — a dull name for a chip that's going to wipe the floor with the ordinary Pentium. If you bought a high-specification PC before Christmas, it's time to start smacking your head against the wall because these new chips don't cost any more than the old ones. The real benefits of MMX come through specially coded multimedia applications, but Intel also claims they are 10-20% faster on normal software. We couldn't wait to test this and got hold of the first eight MMX PCs in the country. We asked for a basic 32Mb RAM but also said that we'd like to see the machines specified up to the back teeth. The suppliers responded in style — the test includes two SCSI machines, and modems and backup devices galore. And are they fast? You'd better believe it! Every single PC in this group test, including the 166MHz Dell, beats the living pants off the fastest machine in last month's top-end 200MHz test.

For more speed than you can shake a stick at, read on...

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Compiled by Adam Evans
Contributors Eleanor Turton-Hill, Gordon Laing

Carrera Power Media P200 MMX

This Carrera is a pretty rugged machine whose looks are softened by some nicely designed curves. It is housed in a large mini tower which ought to provide ample room for expansion; sadly, this theoretical extra space is wasted by an untidy interior which makes access to the motherboard somewhat awkward. On the plus side, the Carrera features the easiest case to open and close with a very simple lockable side panel arrangement.

This is one of two machines in the test to feature an Adaptec 2940 Ultra Wide SCSI card, controlling the enormous 4.5Gb hard drive but not the CD-ROM drive. The graphics card is a 4Mb Matrox Mystique.

We were pleased to see a 100Mb Iomega Zip drive supplied as standard but were disappointed not to be given a disk for it. Also included is an internal US Robotics Sportster 33.6 faxmodem.

The Carrera is the first machine we have seen to feature the new



SoundBlaster AWE 64 sound card (see *First Impressions*, p74). The supplied Yamaha speakers are excellent although a subwoofer would make a lot of difference. The Mitsumi keyboard is a bit of a let-down, with a very spongy action.

Carrera has taken an independent approach in supplying Lotus SmartSuite 96 as part of the software bundle. Also included is CorelDraw 4. This is a perfectly good package but it did strike us as ironic when the (admittedly more expensive) MMX-enabled CorelDraw 7 is already out. A packing error meant that the Games Pack was omitted from the review machine but it will be included in future.

● **Monitor** Though not quite so good as its elder brother, the Pro, the Iiyama Vision Master 17 is a fine monitor with a bright, clear, and steady picture.

PCW Details

Hardware Bundle 33.6Kbps faxmodem, 100Mb Zip drive, Yamaha M20 speakers
Software Bundle Windows 95, 3D Games Pack, Lotus SmartSuite 96, CorelDraw 4, Quicken, PC Check
Warranty 1 year on site then 2 years labour RTB
Technical Support Toll-free telephone, fax
Price £2,995 (excl. VAT)
Contact Carrera Technology; tel 0171 830 0486, fax 0171 830 0286
Good Points Goes like a bomb — it was only a whisker behind the Dan in the VNU Labs tests.
Bad Points Expensive.
Conclusion A great machine with high-quality components but at an equally high price.
★★★★

Dan Dantum 95/MMX200

Dan has a deserved reputation for producing well specified, solidly built machines and its latest effort is no exception. The Dantum 95/MMX200's clean-cut average styling makes it the kind of PC you can happily take home to meet your mother.

The interior is well laid out with easy access to the vital organs and plenty of room for expansion. The Matrox Mystique graphics card performed disappointingly in our recent 3D group test (PCW Jan) but given the performance of the Dan in this test we suspect that Matrox may have sorted out the problems with its latest release of drivers.

We were impressed by Dan's decision to include a built-in 1Gb Iomega Jaz drive (with one cartridge included). This is great for backups and storing little-used files; it is even possible to run applications directly from a Jaz drive. A 33.6Kbps faxmodem is also fitted.

The Dan is the other machine in the test to feature an Adaptec Ultra Wide SCSI card, controlling both the 2Gb hard drive and the Jaz, but not the



CD-ROM drive. SCSI adds to the price but the speed increase is clearly noticeable in the VNU Labs test results.

The sound card is the standard SoundBlaster AWE 32 but the speakers really let the side down. Even by the low standards of computer speakers these are pretty grim — they look cheap and they sound nasty. The keyboard is a little spongy but well within the limits of personal preference.

The documentation supplied with the system is helpful and reasonably comprehensive. The unexciting software bundle is adequate and includes Encarta 97 and Microsoft Works.

● **Monitor** The Iiyama Vision Master Pro 17 is an excellent monitor with a particularly crisp and steady picture. The on-screen controls are simple and easy to master.

PCW Details

Hardware Bundle Dan Hi-Fi speakers, 33.6Kbps faxmodem, 1Gb Jaz drive
Software Bundle Windows 95, Encarta 97, MS Works 4, PagePlus 95
Warranty 1 year back to base
Technical Support Telephone, fax
Price £2,810 (excl. VAT)
Contact Dan Technology; tel 0181 830 1100, fax 0181 830 1122
Good Points Goes like a cheetah on amphetamines and includes the fabulous Jaz drive.
Bad Points The awful speakers.
Conclusion If you can afford it, buy it — but reserve some extra cash for new speakers.
★★★★



SOUND CARD Photography by David Whyte

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Commended

Dell Dimension XPS M166S

Dell has opted to make the Pentium MMX chip the *de facto* processor for the high-end Dimension XPS range. Unfortunately, Dell only had a 166MHz MMX machine available for review which means that direct comparisons with the other 200MHz machines in the test are impossible.

This is also the only desktop in the test but it still has plenty of room for expansion inside. The case design is passable though a little boxy. Opening up the machine is simplicity itself and reveals a well designed interior; our only gripe is that access to the expansion bays is blocked by a large mass of cabling.

The Intel motherboard has 512Kb secondary cache and 32Mb of 168-pin SDRAM, upgradable to a maximum of 64Mb. The hard drive is a Western Digital 3Gb EIDE.

The graphics card is the excellent 4Mb Matrox Millennium. However, Dell



messed up by supplying documentation for the wrong card, a Number Nine 9FX Reality 332 (the company's standard card for the XPS range).

Dell has included a SoundBlaster AWE 32 sound card and Altec Lansing ACS290 speakers. These are different — and frankly, inferior — to the Altec Lansing units supplied with the Gateway. The keyboard is a well designed compact model though we found it a little on the spongy side.

The only software apart from Windows 95 that Dell includes is Microsoft Office Pro 95. This was not supplied with the machine we reviewed but Dell assures us that it will be included in future. We were not particularly impressed with the amount of documentation supplied, though the system guides were well written and informative.

● **Monitor** This is a rebadged Nokia which has a clear, precise display on a par with the Iiyama Vision Master Pro 17. It is nicely designed and looks good on the desk.

PCW Details

Hardware Bundle Altec Lansing ACS290 speakers and subwoofer

Software Bundle Windows 95, Microsoft Office Pro 95

Warranty 1 year collect and return

Technical Support Telephone, fax

Price £1,699 (excl. VAT)

Contact Dell; tel 01344 720000, fax 01344 723695

Good Points The best performance by a 166MHz PC we've ever seen.

Bad Points The mix-up with the supplied software and documentation.

Conclusion Quick and reasonably priced but not as well specified as the other machines here.

★★★★

Evesham Micros Vale Platinum HXSE P200

From the outside, this Evesham Vale machine appears to be the runt of the group — the plastic casing seems fragile and likely to snap at any moment. But beneath this flimsy exterior lies a well built PC with the actual construction being very sound indeed.

The case opens easily by unclipping a side panel and reveals a fabulously tidy interior with so much open space that you could swing a (very small) cat inside. Despite being a mini-tower, there is a lot of room for expansion with three free disk bays and room for two extra hard drives.

The Evesham is the only machine not to have 512Kb secondary cache. The 256Kb supplied is soldered on to the motherboard and cannot be upgraded. This is certainly a contributing factor to the Evesham's last place in the VNU Labs tests (out of the 200MHz machines).

The 4Mb Matrox Millennium is an excellent graphics card and a proven performer. The wavetable sound is provided by an on-board Yamaha chipset and the monitor features built-in speakers which, for some inexplicable reason, need a



separate power supply. The sound quality of these speakers is easily the worst out of the machines reviewed here.

A 33.6Kbps faxmodem is fitted and the Evesham also includes a Microsoft IntelliMouse with the little wheel between the two buttons. This may or may not be a good thing depending on your viewpoint.

The bundled software contains the only MMX-enabled titles in the test and is a good mix of games and reference software (though no business applications are included).

● **Monitor** The Goldstar Studioworks 78m is a multimedia model with built-in speakers. We were disappointed with the display: although steady at 1024 x 768, the picture was not as sharp as the other monitors.

PCW Details

Hardware Bundle 33.6 faxmodem

Software Bundle Windows 95, POD, Space Station Simulator, Ultimate Human Body 2, Timetables of Technology, Third Dimension

Warranty 1 year on site

Technical Support Telephone

Price £1,899 (excl. VAT)

Contact Evesham Micros; tel 01386 765500, fax 01386 765354

Good Points MMX-enabled software.

Bad Points Poor performance and sound quality.

Conclusion The cheapest of the 200MHz machines but not by enough to warrant the poor performance.

★★

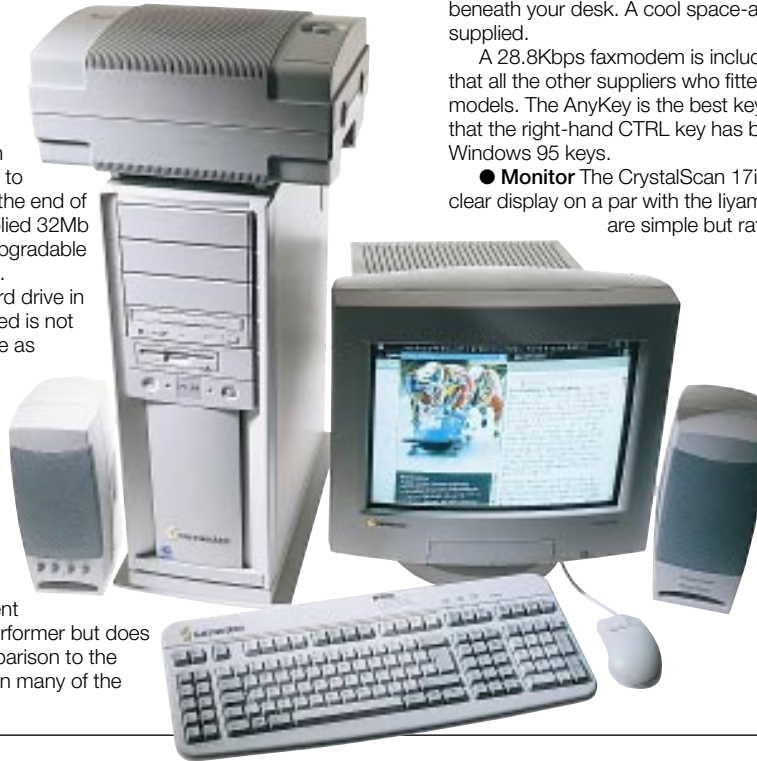
Gateway P5-200 MMX

As always with the company's top-of-the-range PCs, this Gateway is housed in an enormous tower case. It affords an extraordinary amount of room for expansion and incorporates some

new styling on the front panel.

The interior is well organised and the Hitman motherboard incorporates the handy power-off feature which spares you from having to press the Off switch at the end of a day's work. The supplied 32Mb of 168-pin SDRAM is upgradable to a maximum of 64Mb.

The 5Gb Maxtor hard drive in the machine we reviewed is not standard but is available as an upgrade from the 3.8Gb Quantum which is included in the price. Annoyingly the disk had not been partitioned, and to add insult to injury the manual was for the Quantum drive. The 4Mb STB VIRGE 3D graphics card is a decent middle-of-the-range performer but does lack something in comparison to the Matrox cards featured in many of the PCs in this group test.



The sound card is from Ensoniq, a company well known for high-quality wavetable samples. The Altec Lansing speakers and subwoofer sound good and are among the best in the test. Admittedly, the subwoofer does look like a large fan heater but you can always hide it beneath your desk. A cool space-age style microphone is also supplied.

A 28.8Kbps faxmodem is included — a curious choice, considering that all the other suppliers who fitted modems opted for 33.6Kbps models. The AnyKey is the best keyboard in the test; our only gripe is that the right-hand CTRL key has been removed to make way for the Windows 95 keys.

● **Monitor** The CrystalScan 17in is a decent monitor with a solid, clear display on a par with the Iiyama Vision Master 17. The controls are simple but rather fiddly.

PCW Details

Hardware Bundle Altec Lansing ACS410 speakers, ACS 250 subwoofer, 28.8Kbps faxmodem

Software Bundle Windows 95, MS Office 95, Internet Bundle

Warranty 3 years: 1st year on site, 2nd & 3rd years RTB

Technical Support Toll-free telephone, fax

Price £2,023 (excl. VAT)

Contact Gateway 2000; tel 0800 172000, fax 00 353 1 848 2022

Good Points Above-average performance at a reasonable price.

Bad Points The faxmodem really ought to be 36.6Kbps.

Conclusion A quality entry but not exactly bristling with added extras.

★★★

Micron Millennia MXE200

It is obvious that quite a bit of work has gone into the case design of this machine. Sadly, this was wasted effort, with the Micron coming across as just another anonymous-looking PC. The case is also very difficult to open — three hands and a degree of pure brute force are required.

The interior is tidy with good access to the motherboard. There is a lot of room for expansion with one free 5.25in bay and two free 3.5in bays which are unfortunately full of wiring. The Micronics motherboard has a soldered-on Vibra 16 chip which takes care of the sound processing. The actual aural experience is provided by the same high-quality Yamaha speakers that are supplied with many of the other machines in this test.

The hard drive is a 2Gb Quantum Fireball and the graphics card is a Diamond Stealth 64 3D.

As with the Panrix machines,

Micron is now fitting 100Mb omega Zip drives as standard (one disk is included). The keyboard is rather lifeless but by no means the worst in the test. The Micron is the only 200MHz PC not to include a modem, a strange omission considering the price.

The software bundle is a definite disappointment, with only Windows 95 and Microsoft Works 4 being included. The Windows desktop did have an installed shortcut to Microsoft CD Sampler but this was not supplied with the review machine.

Panrix imports pre-built Microns from the USA and also takes care of the warranty and technical support.

● **Monitor** The Iiyama Vision Master 17 is a fine monitor though not as good as the Pro version. The picture is clear and steady, on a par with the Gateway CrystalScan.



PCW Details

Hardware Bundle Yamaha M20 speakers, 100Mb Zip drive

Software Bundle Windows 95, MS Works 4

Warranty 2 years on site

Technical Support Toll-free telephone, fax

Price £2,125 (excl. VAT)

Contact Panrix; tel 01132 444958, fax 01132 444962

Good Points Zip drive.

Bad Points Poor performance, mediocre software bundle, expensive.

Conclusion It may have a Zip drive, but otherwise this is an average machine at an overinflated price.

★★

Panrix Thunder 200X

The Panrix is a groovy-looking machine featuring a natty column design on the front. Removing the case is very easy and does not require a screwdriver, though replacing it proved a little tricky. This is the only machine in the test to have properly labelled sockets, which makes setting up the PC a breeze.

The interior is tidily designed and contains a Micronics motherboard with support for two USB ports. There is some room for expansion with one 5.25in bay and one 3.5in bay free. The hard drive is a 3Gb IBM and graphics are courtesy of a Diamond Stealth 3D.

The sound card is a SoundBlaster AWE 32 and the Yamaha speakers produce a very acceptable sound, though it would have been improved with the addition of a subwoofer. The keyboard is not one of the reasons for buying this machine: it's not quite as lifeless as the Viglen but typing on it is



definitely not a pleasure.

Panrix is now supplying 100Mb Iomega Zip drives as standard in its machines which is a very welcome addition to the basic package (one disk is included). A Diamond 33.6Kbps faxmodem is also fitted.

The Panrix turned in the best performance out of the non-SCSI PCs in the VNU Labs tests, with only the Gateway staying close.

However, considering that an extra £315 will buy you the bullet-like Dan with Ultra Wide SCSI and a 1Gb Jaz drive, the Panrix does seem somewhat overpriced.

The Thunder 200X is supplied with Microsoft Office 95 Pro and limited but competent systems documentation.

● **Monitor** The supplied monitor is the excellent Iiyama Vision Master Pro 17.

Its crisp, steady picture and easy-to-master controls make it the best in the test.

PCW Details

Hardware Bundle 33.6Kbps faxmodem, 100Mb Zip drive, Yamaha M20 speakers

Software Bundle Windows 95, Microsoft Office 95

Warranty 2 years on site

Technical Support Toll-free telephone, fax

Price £2,495 (excl. VAT)

Contact Panrix; tel 01132 444958, fax 01132 444962

Good Points The best performance out of the non-SCSI machines.

Bad Points Expensive.

Conclusion Quick but overpriced.

★★★

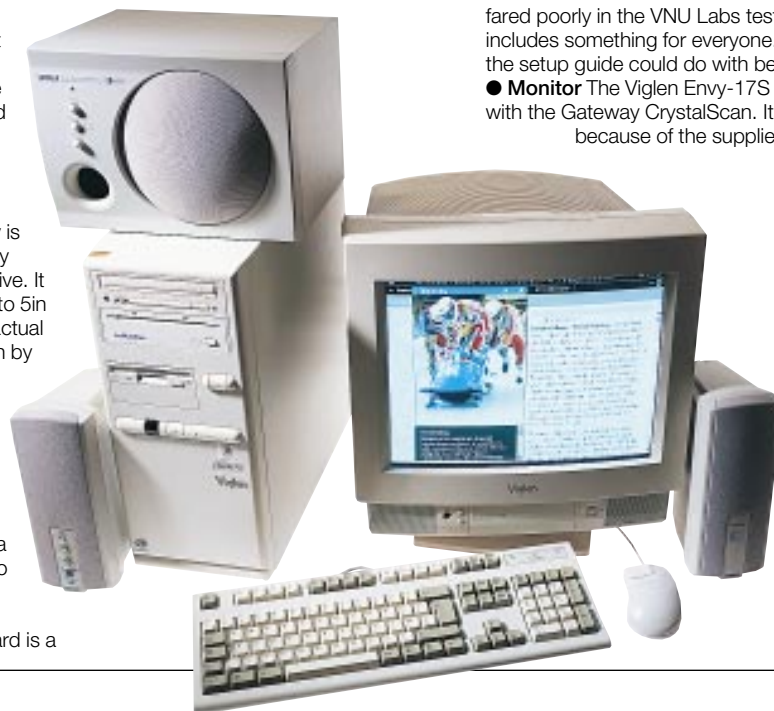
Viglen Awesome 200 Plus MMX

Here at PCW we don't judge by appearances. Which is a good thing for Viglen, because this machine combines the usual lumpy styling with a keyboard that's nothing special. Thankfully, keyboards are easily replaced.

But let's not get carried away: beneath this disappointing surface, the Viglen is sturdily built with a tidy interior giving good access to all the important bits and pieces. There is a reasonable amount of room for expansion with one spare 3.5in bay and room for one extra hard drive.

This may not sound like a lot of space, but one bay is already occupied by the built-in photodrive. It can take paper up to 5in by 7in though the actual scanning area is 4in by 6in. Obviously the size is limiting, but if all you want to do is scan photographs and the occasional humorous drawing of the boss, this is a very nice addition to the basic specification.

The graphics card is a



2Mb ATI 3D Xpression +, using the 3D RAGE II

chip. Two different ATI cards using this chip turned in decent though unspectacular performances in our recent 3D group test (PCW Jan). Viglen has strayed from the herd in its choice of sound card, an Audio Drive 32. The Yamaha speakers include a subwoofer and produce by far the best sound in the test.

This machine finished first in the closely grouped Doom2 test but fared poorly in the VNU Labs tests. The software bundle is superb and includes something for everyone. The documentation is thorough but the setup guide could do with being clearer.

● **Monitor** The Viglen Envy-17S has a clear, steady picture on a par with the Gateway CrystalScan. Its tiny built-in speakers are redundant because of the supplied Yamaha speakers.

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Highly
Commended

PCW Details

Hardware Bundle 33.6Kbps faxmodem, internal photocopier, Yamaha M20 speakers and subwoofer

Software Bundle Windows 95, Works 95, Win95 Tutor, Mech Warrior II, Wipe Out, Assault Rig, Encarta 96, Wine Guide, Money, Publisher

Warranty 1 year BTB

Technical Support Toll-free telephone

Price £2,001.17 (excl. VAT)

Contact Viglen; tel 0181 758 7000, fax 0181 758 7080

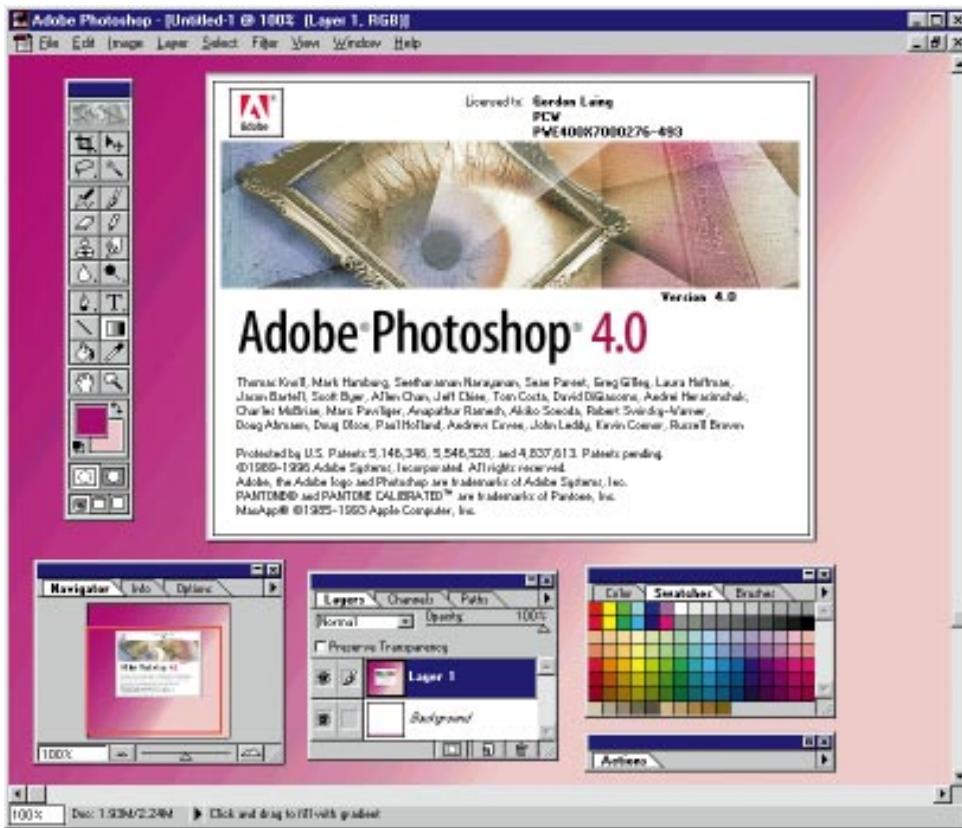
Good Points The photocopier and the generous software bundle.

Bad Points A disappointing score in the VNU Labs tests and a truly bad keyboard.

Conclusion Very good value for money but not a great performer.

★★★

New technology: All about MMX



These are impressive claims which we decided to check out for ourselves.

On non-MMX applications the VNU Labs test results indicate a 10-20% increase in speed (see "Results", p186), in line with Intel's claims. There were very few MMX-enabled applications around at the time the tests were done but we did manage to get our hands on copies of CorelDraw 7 and Adobe Photoshop 4. We installed these packages on one of the MMX machines and ran a series of four tests. Then, replacing the MMX chip with a standard 200MHz Pentium, we ran them all again. The results were interesting. Two of the tests showed a speed increase of around 8% — less than expected even for a non-MMX application. The other tests showed speed increases of 24% and 45% — much

Adobe Photoshop 4 was one of the first applications we received to make use of the enhancements specific to MMX processors. CorelDraw 7 followed closely behind, both claiming performance benefits when used on an MMX PC. (See "VNU Labs Report", p180)

Hands up if you know what MMX stands for. No? It's not surprising: according to Intel, it's just a brand name and doesn't stand for anything. However, if you guessed at MultiMedia eXtension you can pat yourself on the back because this is the exact area at which the new technology is aimed. Intel claims that MMX will bring richer, more satisfying audio, video, graphics and online experiences.

MMX is the most significant change to the basic architecture of the PC processor for ten years. There are three main enhancements:

- the on-board Level 1 cache of a standard Pentium has been doubled to 32Kb. This reduces the number of times the processor has to access slower off-chip memory areas for information;
- fifty-seven new instructions have been added which are specifically designed to manipulate and process video, audio and graphical data more efficiently; and
- a new process called Single Instruction Multiple Data (SIMD) has been developed which enables one instruction to perform the same function on multiple pieces of data simultaneously. This speeds up compute-intensive loops, which are common to many multimedia applications.

These enhancements to the processor will speed up all applications, not just those enhanced for MMX. Intel claims a 10-20% speed increase using non-MMX software and a whacking 60% increase on MMX-enabled applications (based on Intel's own Media Benchmark).

more impressive, though still not up to the 60% quoted by Intel. These results may not be quite as strange as they appear. Our tests concentrated on specific functions within the applications and as such we would expect variations on the amount of improvement gained. This is because the speed increase offered by MMX only applies to particular types of code most often associated with multimedia functions.

The MMX processor is currently available in 166MHz and 200MHz versions for desktop systems and in 150MHz and 166MHz versions for notebooks. If you are thinking about upgrading an existing Pentium, 166MHz Overdrive processors with MMX technology will become available during the first half of 1997, with 200MHz upgrades appearing in the second half. For the time being we expect programmers to develop applications to run on both MMX and non-MMX PCs, with the extra features of the MMX chip being used when present. However, as applications come to rely more on the extra speed of the MMX processor, software will appear which will not run effectively on standard Pentiums. This will almost certainly lead to the production of Pentiums being phased out over the next few months, particularly as the price premium for the MMX version is negligible. This fits in perfectly with Intel's medium-term planning, with Klamath, the consumer version of the Pentium Pro with MMX Technology, arriving in the second half of 1997.

Adam Evans



VNU Labs Report: Test Procedures

Different types of applications measure different aspects of a PC's performance, so it's important to use more than one benchmark to gain an accurate and rounded picture of each machine. With each PCW group test, new technology appears, so our tests are continually enhanced to reflect these changes.

Each of the eight machines included here has been put through three separate tests. The first is a standard system-level test designed to closely simulate real-world use. Complete versions of industry-standard Windows 95 applications are installed — currently Word, Excel, WordPerfect and FoxPro — so that performance can be assessed in the three key areas of word processing, spreadsheets and databases.

A collection of macros are then run in each application and every process is timed and recorded. When a copy operation in a spreadsheet is about to take place, the application macro containing the {COPY} instruction will first trigger the stopwatch. When the copy has completed, the time taken is written into a database file. Each test is run three times to provide a consistency check, and the performance score recorded for each application test is averaged out, producing one overall figure.

The second test is a low-level benchmark run in DOS (native mode) measuring the frame-rate performance from Doom. You can try this test on your own PC. Just set up Doom to run full screen (no status bar or sound). At the command prompt type

DOOM2 -TIMEDEMO DEMO1

which starts up Doom's in-built rolling demos, producing two figures. Divide the first one by the second and multiply by 35. The final figure is a measurement of frames per second (see "Results" chart, p186).

The Doom test is an important low-level test which particularly stresses the graphics card and hard disk, giving a good impression of how the machine will perform running games which are resource intensive.

Third is a test designed specifically to measure the performance of Intel's new MMX chip. According to Intel, the enhancements built into MMX's architecture should speed up

performance by 20% on all applications, but using MMX-enabled software the performance gain should improve by a massive 60%. This high speed increase can only be achieved by running applications which make optimal use of the enhanced MMX instruction set.

At the time of writing Adobe Photoshop 4 and CorelDraw 7 both claimed to feature MMX-specific code, so we used these two applications to estimate MMX performance gains. For a true "before" and "after" result we took one of the 200MHz MMX PCs in this group test, timed several processor-intensive tasks, then repeated the process after switching the chip for a plain Intel 200MHz Pentium processor. Consequently, the only element to change was the chip, and any results indicate the differences between the same chip with and without MMX enhancements.

In Photoshop 4 we took the standard Frames.JPG file from the tutorial folder and doubled its image resolution from 72 to 144 dpi, resulting in a slightly heftier 4.46Mb file for the chips to get their teeth into. The three Photoshop tests consisted of timing a manipulation, undoing it, then initiating the next. The first was a standard Crystallise filter, with the default setting of 10. The second was a clockwise free rotation of 3.27 degrees, and the final was a mode change from RGB to CMYK, not including the initial building of colour tables.

The CorelDraw test consisted of timing the drawing of the venerable Snowbarn image at a resolution of 1024 x 768 in 24-bit colour. Corel claims that the MMX enhancements to its latest version improve screen redraw times, and indeed, the Snowbarn certainly used to be a processor-intensive task. However, the performance increase is not as high as it could be on this test due to the absence of MMX-enabled graphics drivers.

The results we are publishing are by no means the final word on MMX, particularly as software developers become more adept at making the right calls for the desired process. Instead, these are a first taster as to what is available today, with a glimpse of what we can expect in the future.

Eleanor Turton-Hill & Gordon Laing

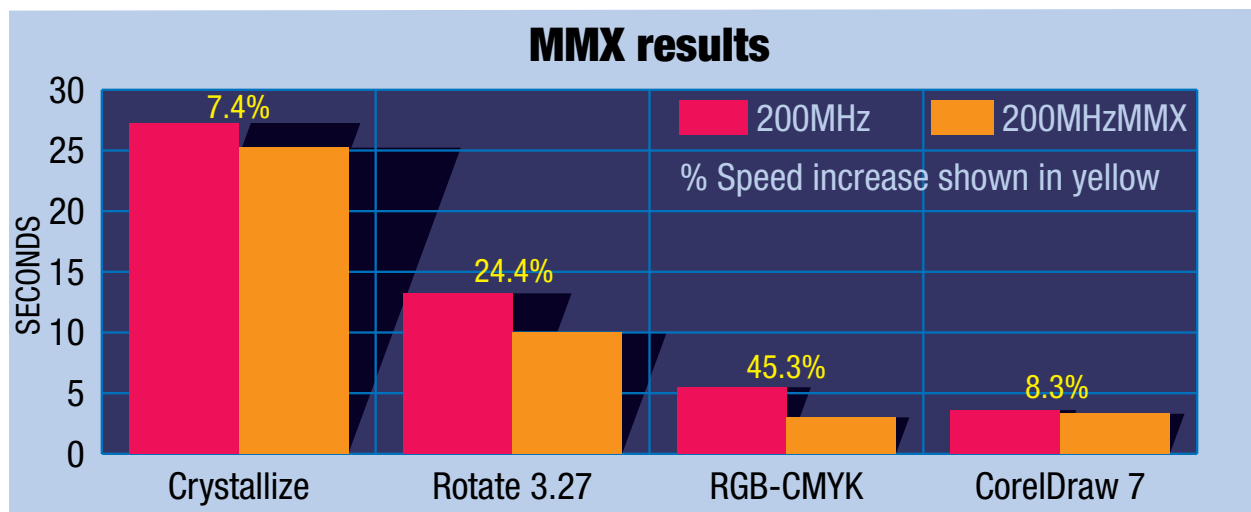










Table of Features				
	 Carrera Technology	 Dan Technology	 Dell	 Evesham Micros
Manufacturer	Carrera Technology	Dan Technology	Dell	Evesham Micros
Model name	Carrera Power Media P200 MMX	Dantum 95/MMX200	Dimension XPS M166S	Vale Platinum HXSE P200
Telephone	0171 830 0486	0181 830 1100	01344 720000	01386 765500
Fax	0171 830 0286	0181 830 1122	01344 723695	01386 765354
Price (excl. VAT)	£2,995	£2,810	£1,699	£1,899
Processor	MMX Pentium 200	MMX Pentium 200	MMX Pentium 200	MMX Pentium 200
Expansion Bus				
PCI slots/ISA slots/shared slots	4 PCI, 4 ISA	3 PCI, 4 ISA, 1 shared	4 PCI, 3 ISA, 1 shared	4 PCI, 3 ISA, 1 shared
Motherboard manufacturer	Super Micro	Asus	Intel	Intel
Motherboard model	STDSA	T2P4	Intel TigerEye	Tuscon
Chipset	Triton 430HX	Triton 430HX	Triton 430VX	Triton 430HX
No. of USB ports	2	0	2	0
No. of spare 3.5in bays	1	1	2	3
No. of spare 5.25in bays	1	2	2	2
Hard Disk				
Manufacturer	IBM	Western Digital	Western Digital	Seagate
Model name	DCHS-UW	WDE2170	Caviar AC33100	ST52520A
Size	4.5Gb	2Gb	3Gb	2.5Gb
Interface	SCSI	SCSI	EIDE	EIDE
Average access time (ms)	9	8	12	11
RAM and Secondary Cache				
Main RAM	32Mb	32Mb	32Mb	32Mb
Max RAM	768Mb	128Mb	64Mb	128Mb
RAM type	EDO	EDO	SDRAM	EDO
SIMM type (pins)	72	72	168	72
Secondary cache (Kb)	512Kb	512Kb	512Kb	256Kb
Max secondary cache (Kb)	512Kb	512Kb	512Kb	256Kb
Cache type	Pipeline burst	Pipeline burst	Pipeline burst	Pipeline burst
Multimedia				
CD-ROM manufacturer	Wearnes	Toshiba	Mitsumi	Hitachi
CD-ROM model	CDD12A	XM5702B	CRMC-FX120T	CDR-8130
CD-ROM speed	12x	12x	12x	12x
Sound card manufacturer	Creative Labs	Creative Labs	Creative Labs	Yamaha/Creative Labs
Sound card model	SoundBlaster AWE 64	SoundBlaster AWE 32	SoundBlaster AWE 32	Yamaha OPL35A + Wavetable upgrade CT1920
Speakers	Yamaha	Dan Hi-fi	Altec Lansing ACS290	Built-in to monitor
Graphics				
Graphics card manufacturer	Matrox	Matrox	Matrox	Matrox
Graphics card model	Mystique	Mystique	MGA Millennium	MGA Millennium
Graphics card RAM/Max RAM	4Mb/4Mb SGRAM	4Mb/4Mb SGRAM	4Mb/8Mb WRAM	4Mb/8Mb WRAM
Monitor manufacturer	Iiyama	Iiyama	Nokia	Goldstar
Monitor model	8617e	9017E	DIO25HE	Studioworks 78m
Monitor size	17in	17in	17in	17in
Monitor maximum refresh rate at 1024 x 768	75Hz	75Hz	75Hz	75Hz
Other Information				
Modem included	●	●	○	●
Modem model & speed	USR 33.6 V/F/M	Dan Fax/Modem 33.6		Vale 33.6
Other extras	100Mb Zip Drive	lomega Jaz 1Gb		
Software supplied	Win95, Games Pack, PC Check, Quicken, SmartSuite 96, CorelDraw 4	Win95, Encarta 97, MS Works 4, PagePlus 95	Win95, Office 95	Win 95, Pod, Space Station Sim, Ultimate Human Body, Tables of Technology, Third Dimension
Standard warranty	1 yr on site then 2 yrs labour RTB	1 year BTB	1 year collect and return	1 year on site
Warranty options	2nd and 3rd year on site	1st year on site	On-site optional upgrades available	2nd yr £69, 2nd + 3rd yrs £149
Key: ● Yes ○ No				

Table of Features



	 Gateway	 Micron	 Panrix	 Viglen
Manufacturer	Gateway	Micron	Panrix	Viglen
Model name	P5-200 MMX	Millennia MXE200	Thunder 200X	Awesome 200 Plus MMX
Telephone	0800 172000	01132 444958	01132 444958	0181 758 7000
Fax	00 353 1 848 2022	01132 444962	01132 444962	0181 758 7080
Price (excl. VAT)	£2,023	£2,125	£2,495	£2,001.17
Processor	MMX Pentium 200	MMX Pentium 200	MMX Pentium 200	MMXPentium 200
Expansion Bus				
PCI slots/ISA slots/shared slots	4 PCI, 3 ISA, 1 shared	4 PCI, 4 ISA, 1 shared	4 PCI, 4 ISA, 1 shared	4 PCI, 3 ISA, 1 shared
Motherboard manufacturer	Intel	Micronics	Micronics	Intel
Motherboard model	Hitman	M55HI+	M55HI+	TC430HX
Chipset	Triton 430 VX	Triton 430HX	Triton 430HX	Triton 430HX
No. of USB ports	2	0	2	0
No. of spare 3.5in bays	0	1	1	2
No. of spare 5.25in bays	3	1	1	0
Hard Disk				
Manufacturer	Quantum	Quantum	IBM	Seagate
Model name	Fireball TM II	Fireball-2	DAQA-33240	ST5250A
Size	3.8Gb	2Gb	3Gb	2.5Gb
Interface	EIDE	EIDE	EIDE	EIDE
Average access time (ms)	11	10	10	10
RAM and Secondary Cache				
Main RAM	32Mb	32Mb	32Mb	32Mb
Max RAM	64Mb	128Mb	128Mb	128Mb
RAM type	SDRAM	EDO	EDO	EDO
SIMM type (pins)	168	72	72	72
Secondary cache (Kb)	512Kb	512Kb	512Kb	512Kb
Max secondary cache (Kb)	512Kb	512Kb	512Kb	512Kb
Cache type	Pipeline burst	Pipeline burst	Pipeline burst	Pipeline burst
Multimedia				
CD-ROM manufacturer	Mitsumi	TEAC	TEAC	TEAC
CD-ROM model	Fx-120T	CD-512E	CD-512E	CD-512E
CD-ROM speed	12X	12x	12X	12x
Sound card manufacturer	Ensoniq	Creative Labs	Creative Labs	Viglen
Sound card model	Ensoniq Vivo 90 Wavetable	Vibra 16	SoundBlaster AWE 32	Audio Drive 32 Wavetable
Speakers	Altec Lansing	Yamaha	Yamaha	Yamaha
Graphics				
Graphics card manufacturer	STB	Diamond	Diamond	ATI
Graphics card model	VIRGE VX 3D	Stealth 3D	Stealth 3D	3D Xpression +
Graphics card				
RAM/Max RAM	4Mb VRAM/8Mb + 4Mb DRAM	4Mb EDO	4Mb EDO	2Mb/4Mb SGRAM
Monitor manufacturer	Mag-Innovision	Iiyama	Iiyama	Viglen
Monitor model	CrystalScan CS500	8617E	9017T	Envy 17S
Monitor size	17in	17in	17in	17in
Monitor maximum				
refresh rate at 1024 x 768	75Hz	75Hz	75Hz	75Hz
Other Information				
Modem included	●	○	●	●
Modem model & speed	CPI 28,800	○	Diamond Supra 33.6	Diamond 33.6
Other extras		100Mb Zip Drive	100Mb Zip Drive	Primax Internal Photo Scanner
Software supplied	Win95, Office 95, Internet Bundle	Win95, MS Works 4	Win 95, Office 95	Win 95, Win 95 Tutor, MS Works 4, Wipe Out, Assault Rig, Publisher, Encarta 96, Wine Guide, Money, Mech Warrior II
Standard warranty	3 yrs (1st yr on site, 2nd & 3rd yr BTB)	2 years on site	2 years on site	1 year BTB
Warranty options	2nd and 3rd year on site	3rd year on site	3rd year on site	1 year on site

Key: ● Yes ○ No



Editor's Choice

The machines in this group test have raised the stakes in the high-end PC game. Every one of them, including the Dell 166MHz PC, easily outperforms the fastest machine in last month's 200MHz group test.

The Doom2 scores are very closely bunched, with the Viglen just edging out the rest of the pack. They don't tell us much about the PCs except that they are all very, very fast.

The VNU Labs test results show the importance of input/output speed, with the two SCSI machines finishing clear of the rest of the field. The Dan and the Carrera are the first PCs to score over 5 in the VNU Labs tests. Of the non-SCSI machines, the Panrix and Gateway turned in the best performances — both are quality PCs and well worth considering.

A Highly Commended award goes to the Dell Dimension XPS M166S which was blindingly fast for a 166MHz machine. The slower processor always meant that it would finish last in the tests, but we were impressed by how close it came to the lowest-scoring 200MHz machine.

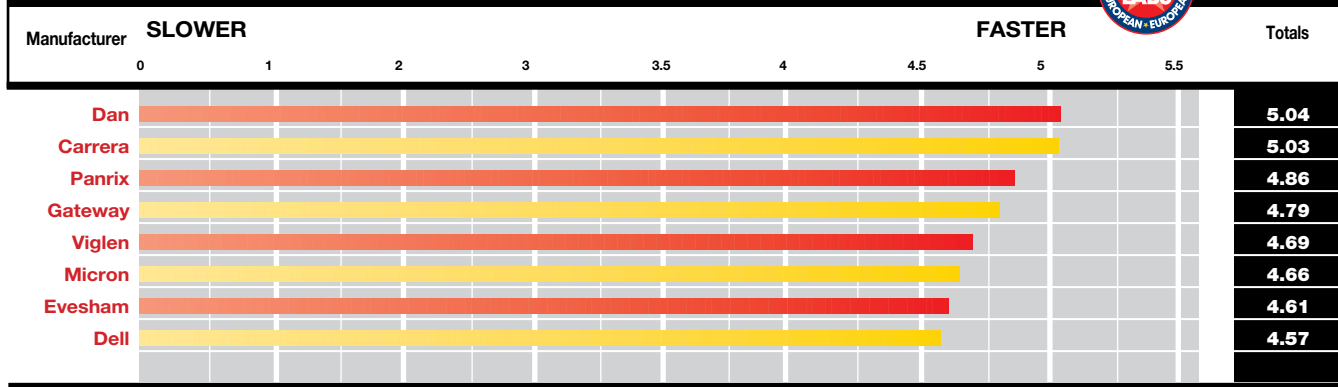
The Viglen Awesome 200 Plus MMX is also Highly Commended for offering excellent value for money. The performance is about average for the non-SCSI PCs but it has a



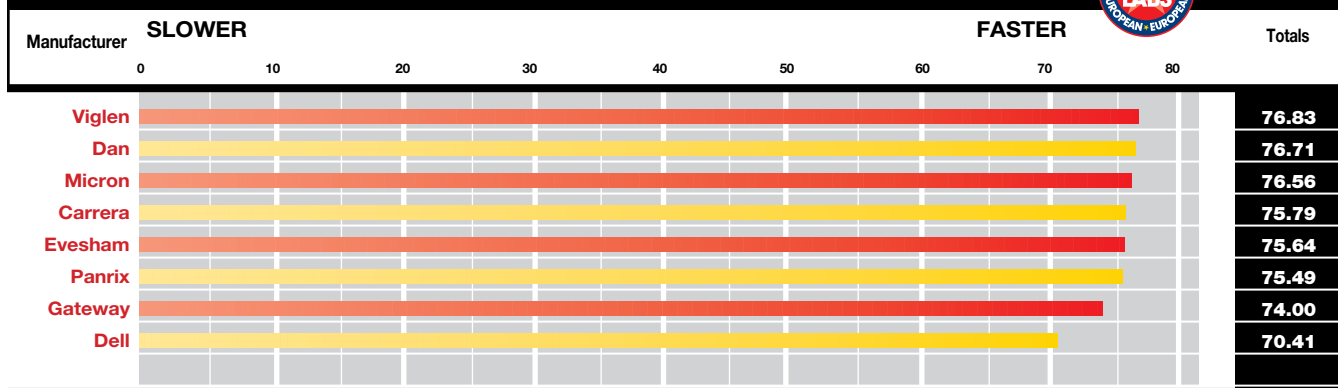
photo scanner, a superb software bundle and the best speakers in the test.

But the Editor's Choice award goes to the Dan Dantum 95/MMX200 which narrowly beat the Carrera in recording the highest labs score ever. The Dan is the second most expensive PC in the test but is jam-packed with features that make it good value for money. The Iiyama Vision Master Pro monitor, Ultra Wide SCSI and 1Gb Jaz drive combine to give it the edge over the rest.

Benchmark Results



Doom II Results



Frames per second

Pocket Power



Have you ever marvelled at the way computer technology is going and said to yourself "That's amazing! How small can computers get?" Pretty small, it seems. Here we take a look at some of the smallest and most powerful PCs, known as palmtops or Personal Digital Assistants (PDAs), on the market. Microchip technology has enabled us to carry around some serious computer technology and perform tasks that, only twenty years ago, only comicbooks dared dream of. Today's palmtops, now becoming known as Handheld PCs, can send faxes, surf the web, make phone calls, handle your personal finances and recognise your handwriting. And surprisingly, this technology is available and affordable to all.

For this annual round-up of palmtops we've gathered twelve models, ranging from the cheap to the insanely expensive, to see just what kind of PC power you can store in your pocket. We also take a good look at what's to come, in the form of the new Windows CE PCs — the next generation of Handheld PCs that have the look and feel of your Windows-based PC.

Sound alluring? Well, read on and see just how much of the future you can hold in your hand right now.

Palmtops Contents

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Compiled by *Dylan Armbrust*
Contributor *Gordon Laing*

HP OmniGo 700LX

The OmniGo 700LX has to be one of the most versatile, most feature laden and most bulky palmtop PCs in this review. It looks massive when compared to the other PDAs, and that's without the mobile phone attached. At 160mm x 86.4mm x 25.4mm it is the thickest, least pocket-orientated model. But don't let looks deceive you: the 700LX could almost be said to have too many features, if that's possible. For a start, it makes use of an Intel 80C186 processor running at 7.91MHz. It has a screen resolution of 640 x 200 and four shades of grey on its LCD. The display is certainly large enough to view and is in the same league as the Psion 3c.

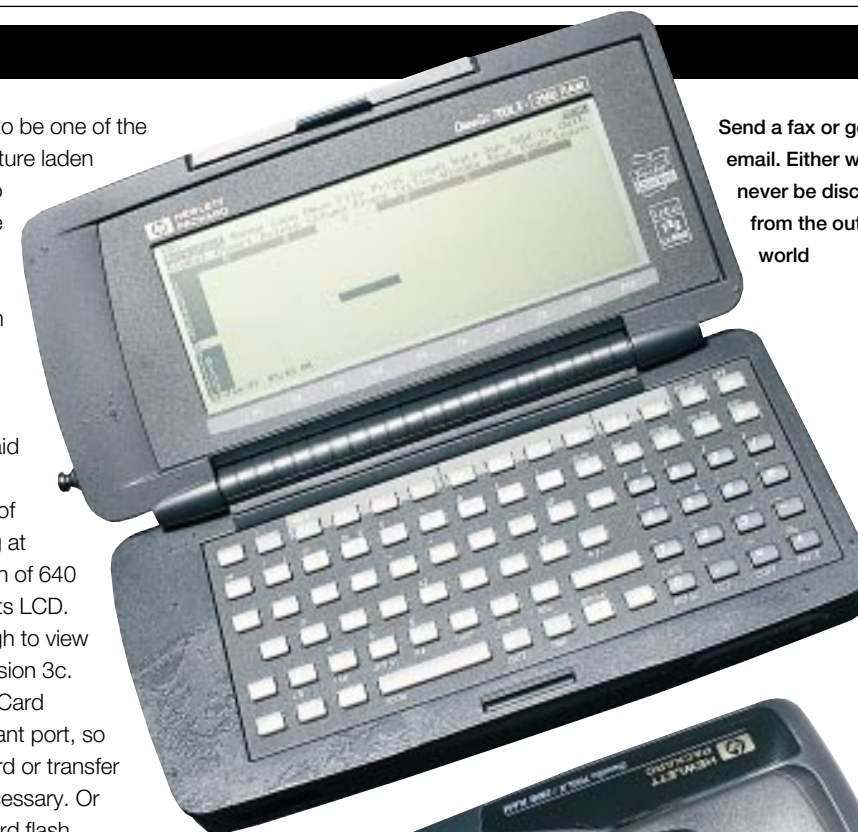
The 700LX has one Type II PC Card (PCMCIA) slot and an IrDA-compliant port, so you can make use of a modem card or transfer data to an IR-enabled printer if necessary. Or you can add up to 40Mb of PC Card flash memory to the existing 2Mb of memory to make the 700LX a respectable handheld PC.

To get the full use out of the 700LX you'll need a Nokia 2110 GSM mobile phone to slide into the top of the unit; without it, all you'll really have is a very wide and bulky PDA. The presence of the mobile phone allows you to take advantage of some of the key features of the 700LX: the built-in fax application to send faxes anywhere in the world, for instance. All you need do is create a document, add a cover page, set the dial properties and press Send. That's it. We tested it several times and it worked like a charm.

You can also take advantage of the built-in Short Message Service (SMA) offered with the 700LX, whereby you can send alphanumeric messages to SMS-enabled mobile phones within your network. There's also an email capability, so long as you have an internet email provider, that can be used with the cc:Mail mobile application.

The 700LX very much has the look and feel of a tiny laptop PC. There's a full Qwerty keyboard, a numeric keypad and ten function keys. When running an application on the HP you'll find it similar to that on any Windows-based PC. You can't point and click, as there's no mouse, but it has the same set of ALT keystrokes to access application functions. Or you can activate a dedicated menu button, similar to the Psion 3c, to do the same thing.

The keyboard itself is very narrow and couldn't be considered ideal for any sort of proper touch-typing. Also, the keys are a little stiff so you're really limited to two-fingered typing: not ideal for



Send a fax or get your email. Either way, you'll never be disconnected from the outside world

composing long documents.

There are about twenty different applications included with the 700LX. There are the aforementioned

communications applications along with the usual word processor, database, contacts, Lotus 1-2-3 spreadsheet, and calculator. In addition HP has included Pocket Quicken, a stopwatch, world time, LapLink Remote, note taker, a phone book, a contacts list, a couple of games and a mini version of DOS 5.0. All these applications have the usual functions you'd expect, and data can be moved from one application to another by cutting and pasting. The Pocket Quicken is a nice touch, especially for those who are meticulous about their personal finances and like to keep track of them. What is lacking, however, is a spell-checker for the Memo, or word processor, application, which is a shame on something so expensive.

PCW Details

Price £799 (not including phone)
Contact Hewlett-Packard; tel 0990 474747, fax 0171 550 7779
Good Points Loads of features, especially the fax, email and SMS applications.
Bad Points Very bulky and expensive, even without the phone. The keyboard isn't ideal.
Conclusion If you're on the road a lot but need to stay in touch, and can afford it, the 700LX could be for you.
★★★

PDA Photography by Bruce Mackie

Nokia 9000 Communicator

Nokia's 9000 Communicator is a mobile phone and personal organiser which can fax, email, and even browse the World Wide Web. Most remarkable of all, it's the size of a telephone handset and weighs 397g with battery. It's usually sold with a subscription to either Cellnet or Vodafone's GSM phone networks, required for the mobile communications; a PCN version for Orange or one2one's networks is expected this year. The closed 9000 can be held and used as a normal mobile phone, or opened up, sat down, and used hands-free with its built-in speakerphone. Opening the fat mobile phone-like 9000 to reveal its PDA keyboard and screen is guaranteed to surprise most passers-by!

The 115 x 35mm, 640 x 200 pixel, eight grey level display is lacking a backlight, but what you lose in illumination you gain in battery life. The rechargeable Lithium Ion battery is good for two hours of communications usage or 30 hours with the phone in standby.

Nine application buttons sit by the hinge. Familiar to all personal organiser users are the address book, calendar, basic note editor, world clock and calculator. There's no spreadsheet or programming language. Contact details are shared between applications. You could search for a phone number, which can then be automatically dialled. Knock out a note, pick out another name from the address book, and fax it to them in a couple of key presses. Also nice are the common in and out boxes, where all documents patiently wait until they can be transmitted or picked up.

Most exciting of all is the Internet button, offering Telnet and Terminal applications which emulate VT100 for remote system access, SMTP internet mail, and a genuine worldwide web browser. Yes, you can access web pages from anywhere you get a GSM signal, and even save or fax them on if you like. Unfortunately, mobile data using the digital GSM phone networks operates at only 9,600 bits/s, which, under less than optimal conditions, could fall considerably lower. Consequently, you're best to avoid graphically intensive web sites or switch image downloading off.

The 9000 has an IrDA-compliant infra-red port for close-range wireless links to printers or PCs, and an optional RS232 serial cable for a physical PC connection. It's possible to use the 9000 as an infra-red mobile faxmodem. You can also transfer files directly to and from the 9000, although with its limited memory it's wise not to get too ambitious, and documents can only be exported in basic text format without formatting. You can download specific 9000 applications from the web, but it's not possible to use the file transfer protocol (FTP) for uploading and downloading files using Telnet or the Terminal Emulator.

At the 9000's heart lies a 24MHz Intel 386 backed up by 8Mb memory, divided into 4Mb for the GEOS 3.0 operating system and applications, 2Mb for program execution, and 2Mb user storage. The 9000 does not have an expansion slot of any kind.

Nokia interestingly describes the 9000 not as an organiser

Personal
Computer
World
**Highly
Commended**

Is it a phone? Is it a PDA? Actually, it's both. The all-in-one Nokia 9000 can phone, fax, email, and even browse the web! Remarkable...



per se, but rather, a complete portable electronic communicator. The phone operates as well as the standard Nokia 2110i it's based on, with the neat additional option of hands-free use, while address management and subsequent dialling, emailing or faxing are faultless.

The web browser is great fun too but admittedly best limited to text only, due to low speed and the relatively small greyscale display. It's a long way from your modern PC desktop browsers packed with fun plug-ins. But so saying, current PDAs cannot compete with the 9000's total level of integration and convenience, and with this in mind, it doesn't seem so expensive. Just imagine being able to make and receive voice calls, faxes, emails or messages while on the move, all from the same small box. And you've never truly surfed the net until you take the 9000 to a tranquil beach with the sea lapping at your toes.

Gordon Laing

PCW Details

Price £799.99 incl. VAT (street; includes connection to Cellnet or Vodafone GSM)
Contact Nokia 0990 002110
Good Points PDA with mobile phone, fax, and web.
Bad Points Limited apps and expansion. Seems pricey.
Conclusion The first totally integrated mobile electronic communicator.
 ★★★★★



Psion 3c

If you've never seen a Psion before, one of the first things that will strike you is the smooth, elongated, clamshell shape. With a profile of 165mm x 85mm x 22mm it will fit easily into any jacket pocket. For those used to the 3c's predecessor, the Psion 3a, you'll note the addition of a thin rubber coating that gives the 3c a warmer and more grippable feel.

The 3c is the follow-up to the very successful 3a with some new features that bring it up to date with some of today's busy users' needs. It makes use of the NEC V30H processor running at a mere 7.68MHz, but don't let clock speed fool you: the 3c is a powerful little tool. Compared to the 3a, not much has changed outwardly. The look and feel is very much the same but Psion has made a few important additions. The first is the addition of an IrDA-compliant infra-red port which can be used to transfer data between IrDA-compliant devices such as PCs or printers, or between IR-enabled Psions such as the Siena. Data transfer is quick, up to 155Kbps, and easy to do, as we discovered using the 3c and the Siena together.

Psion has also added a standard RS232 port using a 13-pin mini-adaptor and dropped its proprietary port altogether. This will help link you up to a PC or other serial device (a modem, for instance). It, too, is rated for 155Kbps but data can only be transferred at speeds up to 57,600bps, which is still impressive by PDA standards. But don't be overjoyed by this news unless you are prepared to pay an extra £68 for the privilege of purchasing PsiWin and use what some have called an "over-complicated" PC interface.

In terms of applications, there are a few changes from the 3a. You can now record and edit sound using Soundmaster, which was once an add-on software feature but now comes as standard. It's great for recording short memos to yourself, if you happen to be one of those people who can do that in public. We tried several different recordings, up to a full minute, and were able to manipulate sounds by adding echo, reverb, and so on. Obviously, the more you record, the more memory you use, but even 60 seconds took up only 480Kb of the 2Mb of memory, leaving plenty for the other apps to run in.

The same set of applications is retained, such as Word, Data, Agenda, Sheet, Time and World, but there are a few changes and additions. Firstly, the 3c now includes Jotter, a notepad facility that allows you to take quick notes on the fly. You just activate the application and enter the data; unlike the 3a there's no need to create a Word file before you begin, which tends to slow data entry down.

Word still has all the necessary, although cut-down, word processing functions you'd expect. It will cut, copy and paste



A great keyboard and display combined with a new IR port and serial port make the 3c a natural choice for many

across different applications and it will save documents in RTF, Word or Text formats up to 40Kb in size.

The Agenda is still very versatile but Psion has added a new view, called Busy, that gives a four-week overview of Agenda entries.

One other change, to Data, allows you to sort database entries by one or more fields and display your search in a form view for easy record location.

The 3c does, however, lack a backlight, which is odd because the US version doesn't. The wide, light-action keyboard does make up for that deficiency, though. If you've got the inclination, and the money, you can add email and web-browsing capabilities to the 3c or you can increase its available storage space by purchasing Psion's solid state disks (SSDs). Either way you can have more software or more storage, or both, using the two SSD slots.

PCW Details

Price £289 (1Mb), £312 (2Mb) retail
Contact Psion; tel 0990 143050, fax 0990 561046
Good Points Added IR and serial port capability, plus some application upgrades.
Bad Points PC link capability a bit weak and expensive.
Conclusion The 3c has some good improvements over the 3a and is still incredibly portable.
 ★★★★★

Sharp ZR-5800

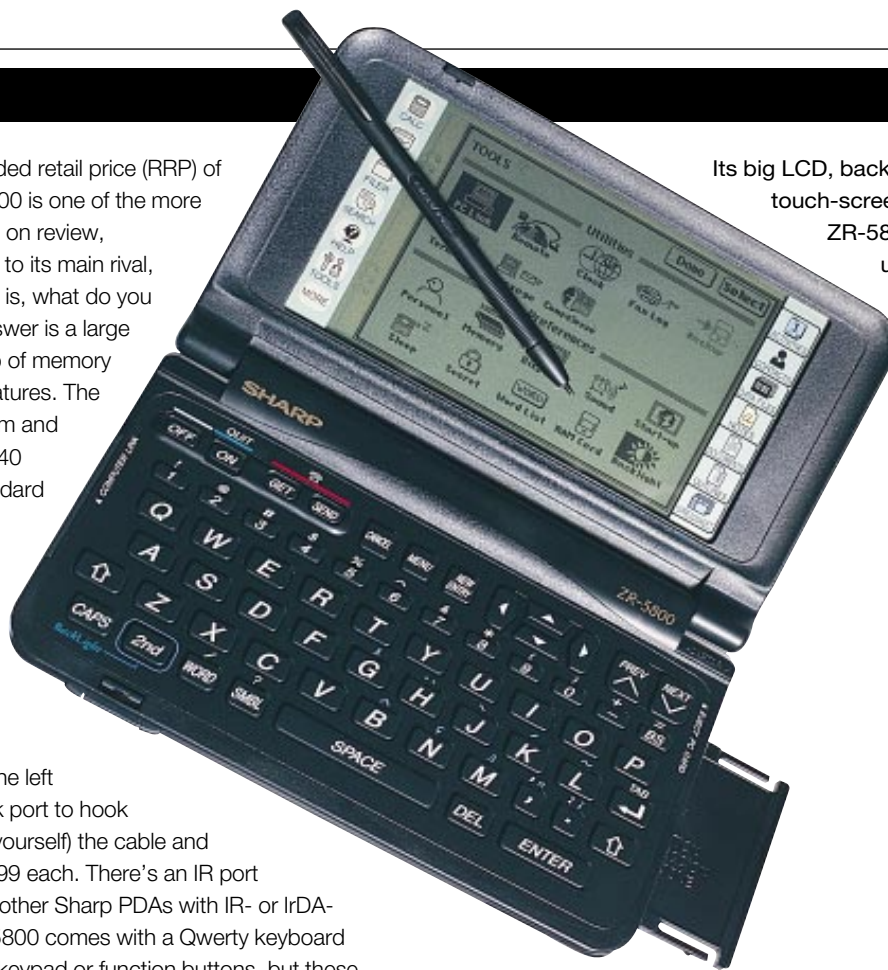
With a recommended retail price (RRP) of £451 the ZR-5800 is one of the more expensive PDAs on review, especially when compared to its main rival, the Psion 3c. The question is, what do you get for your £451? The answer is a large display, a respectable 2Mb of memory and some very versatile features. The LCD size is 130mm x 69mm and has a resolution of 340 x 240 pixels, or half that of a standard VGA resolution. It has a rectangular shape and its exterior comes in a tough, black, leather-like finish. On the right of unit is a Type II PC Card slot capable of holding a modem or flash memory card upgrades to 16Mb. The left edge holds a computer link port to hook up to your PC, but (brace yourself) the cable and PC link software cost £54.99 each. There's an IR port which can transfer data to other Sharp PDAs with IR- or IrDA-enabled printers. The ZR-5800 comes with a Qwerty keyboard but no dedicated numeric keypad or function buttons, but these aren't necessary because of the touch-screen. There is a plastic, pen-like stylus to operate the touch-screen and to jot down handwritten notes in one of the applications.

The key difference between the ZR-5800 and, say, the Psion 3c or the HP OmniGo 200LX is that it makes use of a touch-screen to run its applications. To activate an application all you do is select and touch any one of the 14 application icons. It's not quite point-and-click, but it's close enough.

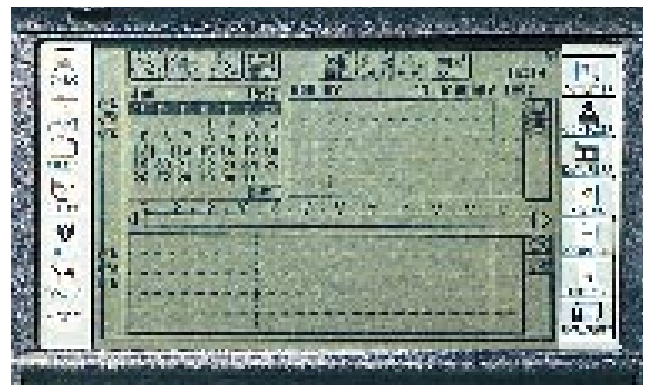
The applications themselves are what you expect with any PDA. There's a good database, called Data Files, that allows you to set up a database of your choosing, including your own custom fields. The prime feature of this is not the database itself, but the fact that information from it can be linked to other files in other applications, such as contacts, appointments, or even spreadsheet information. This allows you to cross-reference all manner of documents and can be especially useful as an on-the-road client contact and details reference tool.

The other applications, such as spreadsheet, documents or appointments, make use of the touch-screen capabilities which can prove to be very useful. If you want to resize a spreadsheet cell, simply use the stylus to click and drag. Or if you need to incorporate a drawing, say a map, into your document the ZR-5800 will accommodate it. There is a simple notepad function that will record any handwritten notes you make. It doesn't have any form of handwriting recognition, like the Apple MessagePad 130, but the application is still very handy if you need to quickly record a note for later use.

The ZR-5800 isn't only limited to being a diary or database. It also incorporates email messaging, fax functions and a terminal



Its big LCD, backlight and touch-screen make the ZR-5800 easy to use day or night



emulator. It will even connect to CompuServe (provided you register with them): all that is required is a Type II modem PC Card. This, combined with its infra-red data transmission capability, make the ZR-5800 a very strong competitor to the Psion 3c. A real plus is its backlighting ability which is obviously ideal for dark conditions, but what you gain in backlighting you lose in battery life. However, Sharp gives you the choice to disable this if you want. The keyboard size and action is respectable, on a par with the Psion and above the HP line. One downside is that the ZR-5800 is about 120g heavier than the Psion.

PCW Details

Price £451 (excl. VAT)
Contact Sharp; tel 0800 262958,
fax 0161 205 7076

Good Points Good comms facilities. Can make handwritten notes. Great information linking feature.

Bad Points A bit heavy and a bit expensive.
Conclusion Some very nice touches, but it may have problems competing at that price.

★★★★

Apple MessagePad 130

The MessagePad 130 is unique among all the PDAs in this review. For a start, it is the only one capable of natural handwriting recognition. And second, it has no keyboard or function buttons whatsoever. The Apple is completely touch-screen based.

The MessagePad 130 makes use of an ARM 610 RISC chip, weighs 450g and uses four AA batteries. Its shape is similar to an old wax-based school writing pad used in the early 19th century and the concept is roughly the same. To enter data all you do is write on the screen and, in theory, the MessagePad should convert your writing into text.

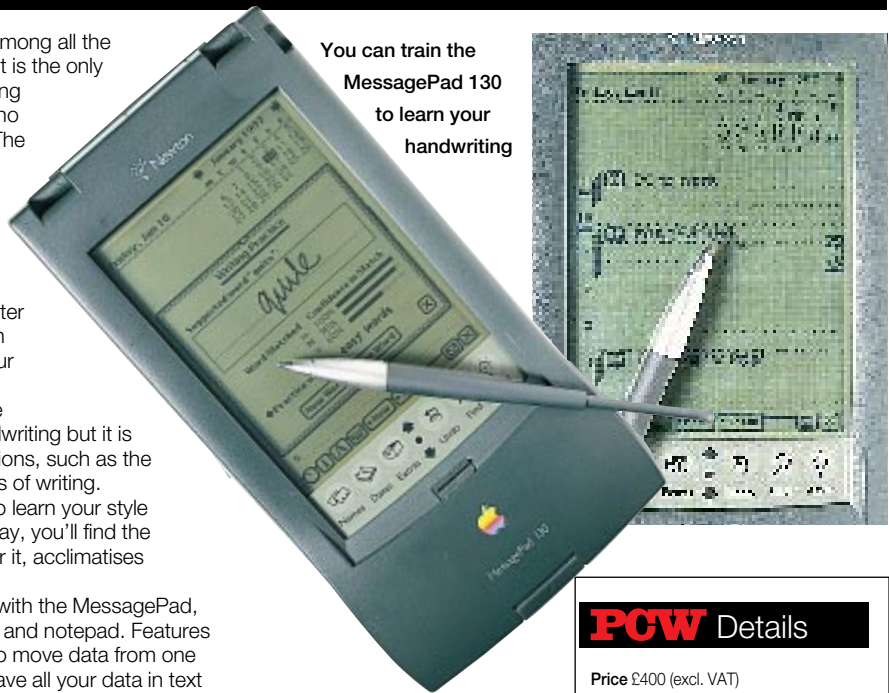
For the most part, the theory works. The MessagePad does, indeed, recognise handwriting but it is far from perfect. You can select various options, such as the tutorial, that will teach you the best methods of writing. Conversely, you can set the MessagePad to learn your style of handwriting the more you use it. Either way, you'll find the recognition improves over time once you, or it, acclimatises to the other.

There are several applications included with the MessagePad, such as a calendar, calculator, contacts list and notepad. Features such as cut, paste and copy can be used to move data from one application to another. You don't have to have all your data in text form, however: the Apple will also store any drawings or sketches you might make.

A fax and print option can be used via a Type II PC Card modem. Alternatively you can use an infra-red port to beam data from one MessagePad to another, but it's not IrDA compliant.

It's easy to add more applications, including web access, to the

You can train the MessagePad 130 to learn your handwriting



MessagePad just by inserting an application PC Card. There's also a good backlight for those who like to operate in the dark.

PCW Details

Price £400 (excl. VAT)
Contact Newton Helpline 0800 639866
Good Points It really does recognise handwriting.
Bad Points It's big and heavy.
Conclusion It's fun to use and easy to learn, but it won't fit in anyone's pocket.
 ★★★

Casio SF-5780

Casio is a company best known for its watches and pocket calculators so it is only natural that it would move into the PDA market with its SF-5780 electronic organiser.

This is probably one of the most basic units in the review. It comes with only 256Kb non-expandable memory and one of the smaller displays in the group — only 85mm x 42mm. It does have a full Qwerty keyboard, a dedicated numeric keypad and ten application keys, though.

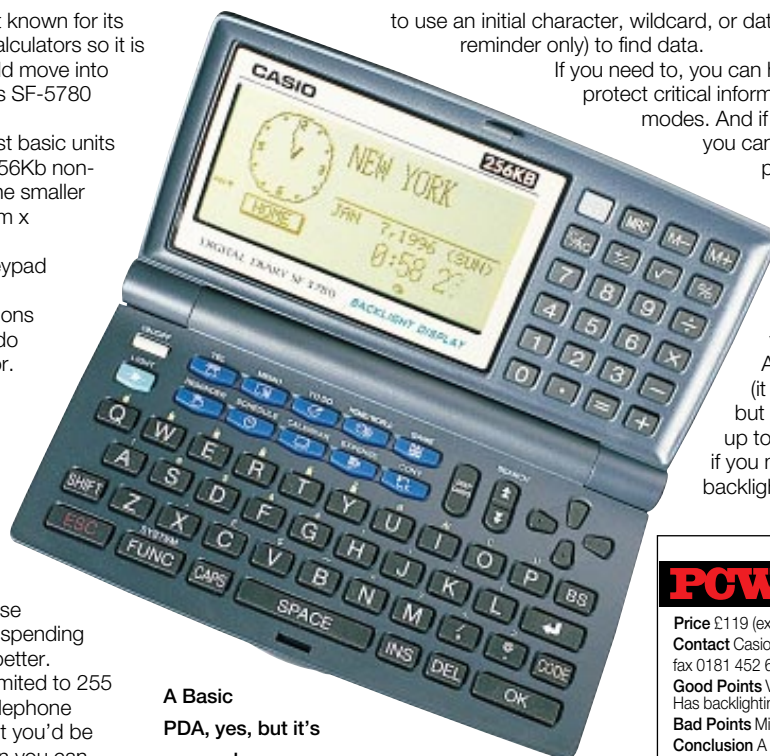
There are all the usual applications such as a telephone directory, to do list, memo, calendar and calculator. There is not enough memory or power in the Casio for it to have a spreadsheet or any kind of communications ability, but it's quite apparent it wasn't intended for that. It does have an Expense Manager mode, Conversion Manager mode and Reminder (or alarm) mode which could be ideal for those who travel a lot and need to track spending or understand the metric system better.

The amount of information is limited to 255 characters for each entry in the telephone directory and calendar modes, but you'd be surprised at how much information you can get into 255 characters. There is also a reasonable search capability that allows you

to use an initial character, wildcard, or date (in schedule and reminder only) to find data.

If you need to, you can hide and password-protect critical information in almost all modes. And if you *really* need to, you can purchase a

proprietary PC link to download data to your PC — you'll have to pay £49.99 for it, though. There's no mains connection so you'll need a supply of AAA batteries on hand (it takes two at a time), but Casio claims you get up to 100 hours of service if you make little use of the backlighting option.



A Basic PDA, yes, but it's no word processor

PCW Details

Price £119 (excl. VAT)
Contact Casio; tel 0181 450 9131, fax 0181 452 6323
Good Points Very thin and compact. Has backlighting.
Bad Points Might be too basic.
Conclusion A good "beginners" PDA for those wanting to ease themselves into this market.
 ★★★

Hewlett-Packard OmniGo 200LX

The 200LX is in a similar category as the Psion Siena. They are most definitely competitors, yes, but they are both lesser versions in their respective product line. The Siena is a pared-down Psion 3c, and the 200LX could be considered a lesser version of the all-bells-and-whistles OmniGo 700LX.

Like the 700LX, the 200LX comes with an Intel 80C186 chip, a 640 x 200 CGA-compatible LCD, and a full Qwerty and numeric keypad. It also has a much sleeker profile of 160mm x 86.4mm x 25.4mm and it weighs only 312g. The case is made of a sturdy black plastic. It has a Type II PC Card slot, an IrDA-compliant infra-red port and, for an extra £18, a Windows PC link. You can choose from either a 2Mb or 4Mb model, but storage can be upgraded through flash memory PC Cards.

The HP PDAs certainly strike us as financially-orientated units. With the presence of Lotus 1-2-3, Pocket Quicken, HP Calc and the dedicated keyboard, you can see that the 200LX is for more than just address storage. Not only does it have a good financial application component, it's also strong in the database and word processing applications as well. And one shouldn't forget the presence of LapLink Remote and cc:Mail Mobile. The 200LX has everything the 700LX does, except for the SMS and fax applications.

Its weaknesses are roughly the same as the 700LX. The keyboard action requires a good push so it's difficult to use for any length of time. Compared to the Psion's overall design, it



Lots of buttons and apps make this an anorak's delight

doesn't fare well, but it does if you compare the applications. The one thing that the 200LX exudes is "techiness", which is perfect for a devoted PDA anorak but not for those who want a simple, clear interface. On this point, the 200LX falls short.

PCW Details

Price £375 for both the 2Mb and 4Mb versions (excl. VAT)

Contact Hewlett-Packard; tel 0990 474747, fax 0171 550 7779

Good Points Loads of features, big display, more pocket-orientated.

Bad Points Very technical-looking keyboard and interface.

Conclusion This is perfect for the experienced PDA user, but HP could still make improvements.

★★★

Psion Siena

With the Siena, it's not a case of what it has but of what it doesn't have when compared to the larger Psion 3c. Physically the Siena is much smaller than the 3c. With a footprint of 150mm x 73mm x 19mm and weighing only 183g with batteries, it was one of the more compact clamshell PDAs in the review. It, too, runs on a NEC V30H chip and it comes with either 512Kb or 1Mb of memory.

There are no PC Card or proprietary SSD slots but it does have an IR and RS232 serial port. The display is half the size of the 3c, with a resolution of 240 x 160 pixels.

It has Agenda, Word, Spreadsheet, Diary and Data applications but no jotter. The functions are almost the same as the 3c, except that there is no spell-checker for documents or graphing feature for the spreadsheet.

The keyboard consists of a Qwerty layout plus eight application keys. Beside the LCD is a dedicated 20-key numeric keypad. This is the one feature that the Siena has over the 3c and it's perfect for crunching numbers while on the go in a shopping market or on the train.

If you need to transfer data you can do it via the IR port, to a printer, PC, or other Psion, or you can make use of the RS232 connection. You'll still need



This slightly top-heavy PDA fits well into any handbag or back pocket

to pay an extra £64 for that privilege, however. There is no sound-recording ability, but this is not really necessary for someone who'd buy the Siena.

At £144 the Siena is a very affordable and useful tool.

You can't send faxes or receive email with it, and it's a bit top

heavy, but it still does the job.

PCW Details

Price £144.64 (512Kb), excl. VAT

Contact Psion; tel 0990 143050, fax 0990 561046

Good Points Dedicated numeric keypad and very compact.

Bad Points A bit top heavy.

Conclusion Perfect for the person who wants a Psion 3c but doesn't need all the bells and whistles.

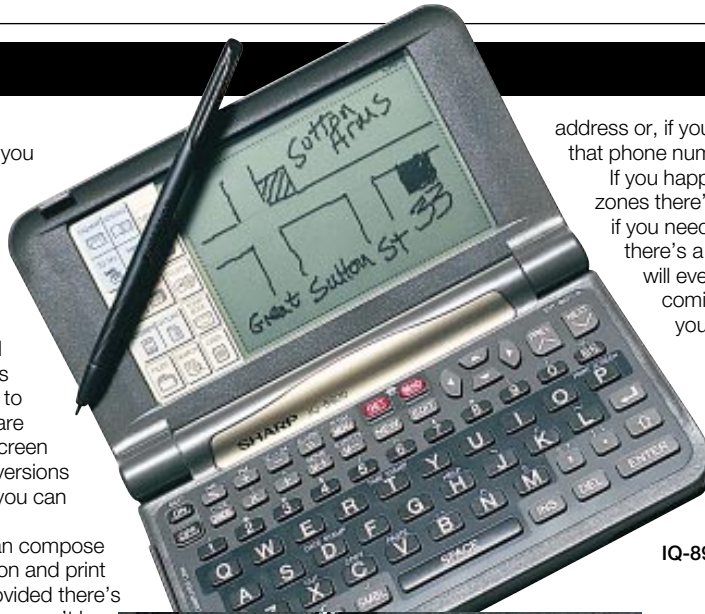
★★★

Sharp IQ-8920

The IQ-8920 is a bit of a medium-cost hybrid, if you consider £279 medium cost. If you take a little of the Sharp ZR-5800 or the Apple MessagePad 130 and mix it with a Casio SF-5780, you get the IQ-8920. It's a combination pen-and-keyboard based PDA. All of the applications, ranging from its word processor (called Notebook) to its calendar to the to do function, are launched via the touch-sensitive screen icons. They are indeed cut-down versions of its big sister, the ZR-5800, but you can still manage well with them.

If you have the patience you can compose whole letters in the notepad function and print them off in standard A4 format provided there's an IrDA-enabled printer nearby. You won't be able to see the whole letter through the 240 x 168 pixel display, but the IQ provides a kind of virtual display, like those offered in PCs, that lets you scroll along the various parts of the document. Typing it all in will take time, but you'll find the Qwerty keyboard action sensitive.

There's also a sketch or notepad application, called Scrapbook, that lets you draw or write whatever information you need and stores it away for later. Again, this is perfect for recording directions to someone's



address or, if you're short of paper, writing that phone number down.

If you happen to cross a lot of time zones there's a world time function. And if you need to do some quick addition there's a screen-based calculator that will even display a paper-like tape coming out the top as you add up your numbers.

There's a respectable 512Kb of memory, and one proprietary plug-in slot for adding applications such as a spreadsheet.

You won't get lost with the IQ-8920's Scrapbook function

PCW Details

Price £279.99 (excl. VAT)

Contact Sharp; tel 0800 262958, fax 0161 205 7076

Good Points Good scrapbook function and mix of pen-based applications.

Bad Points No PC Card slot. PC Link expensive (£55!).

Conclusion Fun and easy to use, but the link hardware and software is too expensive.

★★★

US Robotics Pilot 5000

The Pilot 5000 is one of the most compact PDAs we've come across. It's been described as being no larger than a deck of cards and we'd have to agree. Weighing in at only 160g and using only two AAA batteries with an average life of three months, it has to be one of the most efficient PDAs around.

The Pilot is almost completely pen/touch-screen based, save for the four application buttons on the front, and it has almost all of the features necessary for general use. The applications consist of a diary, memo pad, address book, to do lists and calculator. There's no spreadsheet, email, fax or web-browsing function whatsoever.

The key attribute of the Pilot 5000 is that it incorporates handwriting recognition through the use of the Graffiti alphabet. Graffiti is a simple handwriting technique used by the PDA to recognise and translate into text what one writes on the touch-screen. In this case, the user writes their information onto a pad, divided into two sections, and the Pilot transforms it into text. Letters are entered on the left of the pad while numbers are entered on the right. It takes a little getting used to, but once mastered you'll find entering data into the Pilot fairly easy. However, it does offer a touch-screen Qwerty keyboard as an alternative.

The biggest plus for the Pilot is its PC linking facilities. Included in the price is a HotSync cradle that plugs directly into the serial port of any PC. This, combined with



Use a pen or a finger on the Pilot's touch-screen to crunch those numbers

Personal Computer World
Highly Commended

Windows-based Desktop software, make the Pilot 5000 attractive to any user. All information can be swapped and updated back and forth from PC to Pilot — perfect for entering appointments or a to do list and downloading them to the Pilot to take with you.

PCW Details

Price £195 (excl. VAT)

Contact US Robotics; tel 01734 228200, fax 01734 695555

Good Points HotSync cradle and software are perfect for updating info.

Bad Points You have to learn Graffiti style of handwriting.

Conclusion A great deal, especially with HotSync. It's streets ahead of the others in this regard.

★★★

**Personal
Computer
World**
**Editors
Choice**

Editor's Choice

When one looks over the products featured in this group test, from the lowly programmable watch to the super-sleek Nokia 9000, you can see why owning one of them is like owning a bit of the future. Not everybody has one, but it will only be a matter of time before they do.

The PDAs we reviewed all have one thing in common — they all store information. Whether it's address details or shopping lists, they all act as a depository of data. Some, like the Sharp PB-EE1, do only that, while others, like the HP OmniGo 700LX, are mini-PCs capable of sending faxes, processing financial data or linking up with mobile phones. Some, like the Apple MessagePad 130 or the US Robotics Palm Pilot 5000, can translate handwriting into text.

Either way, the technology gets better, smaller, and cheaper. And this is precisely why we have chosen the Psion 3c for our Editor's Choice award. Its compact design, easy interface, large display and inobtrusive but powerful suite of applications made it a natural choice. Also, the addition of infra-red and RS232 capability, along with its affordable price, put it right at the top.



Our Highly Commended awards go to the Nokia 9000 Communicator and the US Robotics Pilot 5000. The Nokia because it encompasses all that anyone could possibly want, from calculator to web surfer, at a premium; the Pilot 5000 because of its perfect size, affordable price, and excellent PC link via the HotSync cradle and Windows Desktop software.

But honorable mentions must go to the Sharp ZR-5800 and the Apple MessagePad 130. Both these models displayed a variety of features, their notepads for instance, that should put them near the top of anyone's list.

PDA communications

PDAs are capable of communicating with the outside world in a variety of ways. The primary means of input is via a Qwerty keyboard, naturally limited by their physically small size. Some are better than others however, so try them for size.

Pen-based input via a touch-sensitive screen is becoming increasingly commonplace. At its simplest, the pen is used to point or select, while in more sophisticated systems, some form of handwriting recognition may be supported. The Apple Newton MessagePad attempts genuine handwriting recognition, although with variable results. The Newton can be trained to recognise your style and does become more adept as time goes on, but in our experience it will either pick it up quickly or not at all. You can help the process by printing clearly, and in fact the Graffiti system employed by the US Robotics Palm Pilot only recognises simplified characters. Voice recognition is still a long way off, although some PDAs, such as the Psion Series 3, offer audio recording facilities.

It is possible to connect some PDAs to your PC, usually to transfer documents, contacts or schedule information. If this is important to you, then ensure that the PDA can connect and talk to your system and software; most PDAs exchange documents in plain text format. The most common means of connection is via a serial cable (often an expensive optional extra), although some PDAs also boast infra-red ports. These may or may not be compatible with the IrDA standard supported by most infra-red equipped PCs or peripherals. Slot-in cards offer expansion or



Above The written language of the Pilot 5000. **Right** A phone and PDA for truly mobile comms



storage possibilities. A PDA could feature a proprietary slot or one that conforms to a standard such as the PC Card (formerly PCMCIA). Proprietary systems may be specifically designed for a certain PDA, but the choice of options may be smaller and prices could be high. PC Cards are flexible but physically large compared to other formats, and remember — in general, they will sap your power supply.

Cards may offer extra memory, removable storage or communication facilities such as a faxmodem. Suitable modems could come with software or use built-in facilities to allow email, faxing or even web access. It's possible in some cases to connect a suitable digital mobile phone to a PDA and effectively use it as a modem on the move. Be aware that data using a mobile phone operates at a maximum of only 9600bps and that not all PDAs support web browsing.

Gordon Laing

Windows CE

The PDAs and electronic organisers looked at here are all very well, but let's face it: what you really want is a pocket-sized PC, running familiar software, that's 100 percent compatible with your desktop machine. And it goes without saying that you want change from £500. Impossible? Thankfully no, with the advent of the handheld PC (HPC) and the Windows CE operating system.

But hang on: to run Windows 95 as well as a desktop Pentium PC you surely need a portable device with the same innards — a notebook computer in fact, measuring significantly larger than any normal pocket and costing enough to induce tears of despair.

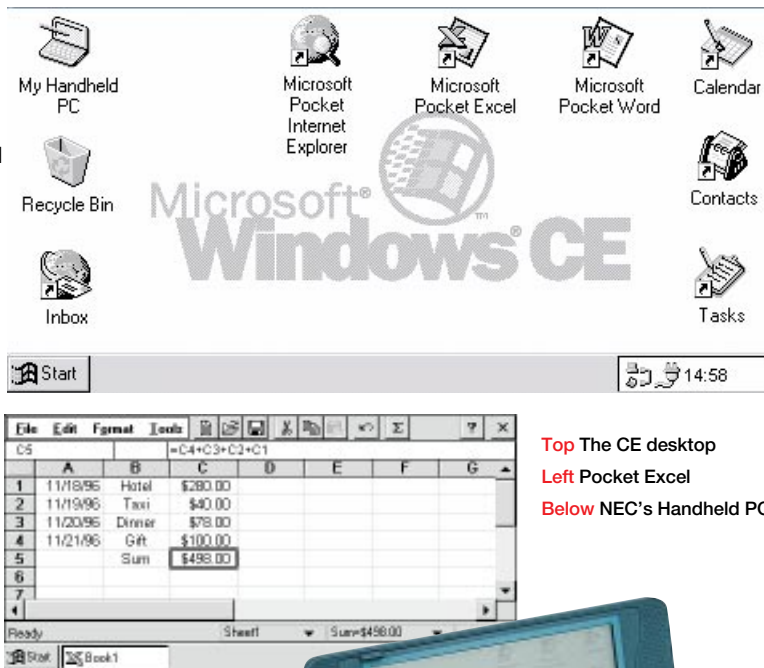
The solution starts with the operating system and applications. Cut out what you don't need, tighten the belt, and generally increase efficiency all round. Stage one was completed by Microsoft last September when it announced its Windows CE operating system, an open, scaleable Windows platform designed for a broad range of mobile computing devices. No-one is entirely sure what CE actually stands for, but likely contenders include Compact Edition or Consumer Electronics. CE looks, feels and works a lot like Windows 95 and is immediately usable for anyone familiar with 95.

Stage two happened at last year's Comdex Fall show in Las Vegas, where seven hardware manufacturers demonstrated the first handheld PCs running Windows CE. Were any minor players involved? No. The truly magnificent seven were Hewlett-Packard, NEC, Philips, Hitachi, LG Electronics (formally Goldstar), Casio and Compaq. The very first models went on sale in the US towards the end of last year, although we'll have to wait until spring for ours. At Comdex I made a beeline for these manufacturers' stands to try out their HPCs with Windows CE for myself.

They are remarkably similar, thanks mostly to Microsoft's strict basic product specifications. All must feature a qwerty keyboard and 480 x 240 pixel, 2-bit LCD touch-screen with stylus, fitted into a pocketable clamshell form factor. Consequently, most come out looking a lot like the Psion Series 3. All run on RISC processors, five using a Hitachi chip while Philips and NEC each developed its own. Memory comes in with 4Mb ROM and 2Mb RAM, both upgradable, an IrDA-compliant infra-red port, serial port, Type II PC Card slot, digital sound using the WAV format, and a notification LED. On the software side they must feature a Win32 API subset including TCP/IP stack, PPP protocol, WinSock 2.0, RAS, DCC and TAPI.

Microsoft has written special versions of its popular applications, named Pocket Word, Pocket Excel, Pocket Internet Explorer, and a collection of personal information management utilities including calendar, address book and tasks. A universal inbox supports SMTP and POP3 protocols and has an open API, allowing email environments to be adapted for compatibility.

The clever bit starts when you connect an HPC to a standard PC running Windows 95. The HPC Explorer application, closely



Top The CE desktop

Left Pocket Excel

Below NEC's Handheld PC

resembling 95's Explorer, automatically detects the connection, and initiates replication and synchronising of PIM data between



Microsoft Schedule+ 7.0a on the desktop and the HPC itself. The results are updated calendars, diaries and task lists. The HPC Explorer also automatically converts Word and Excel documents between Desktop PC and HPC. The view is hierarchical and the process completely drag-and-drop — not dissimilar to using LapLink.

Many of you will have done a double-take at the mention of Pocket Internet Explorer. Yes, it's true: fit a modem to an HPC and you can email, fax and browse the web. At this point, several of the first seven HPCs differ. Some require a PC Card modem, while others offer a gap elsewhere in the device for a modem, leaving the slot free for other purposes. It is possible to connect a suitable digital mobile phone with PC data card for truly mobile comms: LG Electronics showed a mock-up HPC with built-in cellular communications.

Another notable difference is Hewlett-Packard's HPC, which is the only model of the first seven to feature a wider 640 x 240 display, making it immediately the most desirable of the bunch.

The HPCs are quick too, with the OS and applications stored in ROM and consequently launching almost instantly. They are indeed pocketable, measuring around 168mm x 25mm x 98mm and weighing 350g with batteries. Prices are typically \$500 for a base 2Mb model, or \$750 for one with 4Mb and a modem. I can't wait for the UK launch.

Gordon Laing

Having fun on a budget

Owning a PDA doesn't mean you have to spend tons of cash or be too serious about your data storage. You can currently find loads of budget PDAs at your local branch of Boots or Dixons, where prices tend to range from £19.99 to £89.99. They won't compare to the majority of PDAs in this review, but if all you want is an electronic address book or scheduler, you'll want to have a serious look at some of them. On the fun side, you can get hold of some digital watches with some PDA-like applications. Full PDAs they're not, but they're about as close to the video watch sported by Dick Tracey as you'll get.

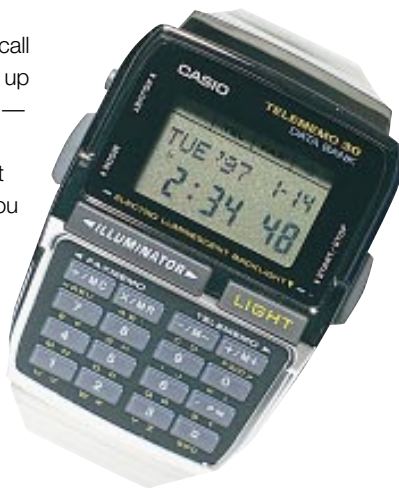
Here we take a look at just a few of the fun or budget items available, but take a look around — you'll be amazed at what's out there.

Casio DBC-30

Now this is what we'd call portable. Forget taking up valuable pocket space — this fits on your wrist! It may not be pretty but it does keep time, and you can store up to thirty contacts along with their phone numbers. And it doesn't stop there. It has a stopwatch, calculator and alarm as well. The downside is trying to enter all your information using the tiny number pad. Just make sure you have a fine-point biro.

Price £44.25 (excl. VAT)

Contact Casio 0181 450 9131



To access or enter data all you do is use the nifty little rubber-tipped stylus that comes with it on the touch-screen qwerty keyboard. It is limited by its 32Kb of RAM but at its size, 122mm x 82mm x 13mm, you won't find anything much smaller.

Price £69.99 (excl. VAT)

Contact Sharp 0800 262958

Casio VDB200

Casio has dispensed with the keypad altogether on this watch. All you need is your biro and you're on your way to programming this little number. The VDB can store up to 200 names and phone numbers, all dividable into four categories: Play, Business, Personal or Private. There's a password protection facility, and the watch automatically sorts any data you've entered and allows you to easily scroll through it when searching. It has an alarm function, stopwatch and backlight, and of course it will tell you the current time as well.

Price £68.08 (excl. VAT)

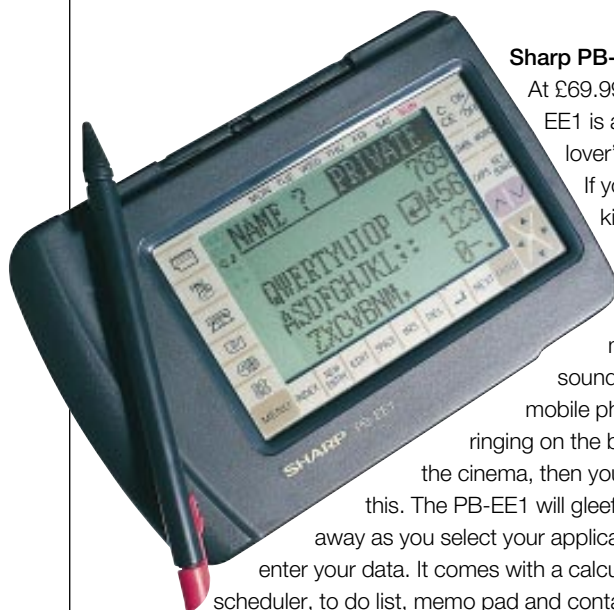
Contact 0181 450 9131



Sharp PB-EE1

At £69.99 the PB-EE1 is a gadget-lover's dream.

If you're the kind of person who doesn't mind the sound of a mobile phone ringing on the bus or in the cinema, then you'll love this. The PB-EE1 will gleefully peep away as you select your application and enter your data. It comes with a calculator, scheduler, to do list, memo pad and contacts list.



Sharp ZQ-4550

The ZQ-4550 is one of Sharp's cheaper clamshell PDAs. It features ten application buttons and a qwerty and numeric keyboard, and it has 128Kb of memory. You can keep your contacts up to date, track expenses, monitor time zones, make an appointment or record a memo.

Price £69.99 (excl. VAT)

Contact Sharp 0800 262958





Table of Features

Manufacturer	Apple	Casio	Hewlett-Packard	Hewlett-Packard	Nokia	Psion
Model	MessagePad 130	SF5780	LX200	OmniGo 700	9000	3C
Price (RRP excl. VAT)	£400	£119.99	£375	£799 *	£799**	£289 (1Mb)
Phone contact	0800 639866	0181 450 9131	0990 474747	0990 474747	0990 002110	0990 143050
Fax	N/A	0181 452 6323	0171 550 7779	172 550 7779	N/A	0990 561046
Size (w x d x h in mm)	101.6 x 203.2 x 30.5	163 x 91.5 x 21.5	160 x 86.4 x 25.4	183 x 87 x 57	173 x 64 x 38	165 85 22
Batt (reg and backup)	4 x AA	2 x AAA & 1 CR2032	2 x AA	2 x AA	Lithium Ion	2 x AA & CR1620
Weight (with batteries)	450g	251g	312g	397g	397g	275g
Processor	ARM 610 Risc	N/A	Intel 80C186	Intel 80C186	Intel 386	NEC V30H
Screen size (in mm)	127 x 76.2	85 x 42	N/A	N/A	115 x 36	127 x 44
Screen res (w x h in pix)	640 x 200	130 x 56	640 x 200	641 x 200	640 x 200	480 x 160
Display cols (greyscale(s))	2	1	4	4	8	2
Standard/max memory	2.5Mb	256Kb	2 or 4Mb	2 Mb	8Mb	1 or 2Mb
No. of keys	Touch screen	74	80	80	71	67
Quoted batt life (cont. use)	120 hours	100 hours	60 hours	60 hours	30 hours	40-60 hours
Expansion slots	1 Type II PCMCIA	○	1 Type II PCMCIA	2 Type II PCMCIA	N/A	2 , 1 RS232 port
Pen based	●	○	○	○	○	○
Word processor	● (optional)	○	●	●	●	●
Spreadsheet	○	○	●	●	○	●
Handwriting recognition	●	○	○	○	○	○
Spell-checker	●	○	○	○	○	●
Infra-red capabilities	● (not IrDA)	○	●	●	●	●
Windows PC Link	●	●	●	●	●	●
Mains input	●	○	●	●	●	●
DTMF (tone phone) dialling	●	○	○	○	●	●
Email/web browsing ability	●/●	○/○	● email	● email	●/●	●/●
Audio recording	○	○	○	○	○	●

*not including phone **including phone & connection

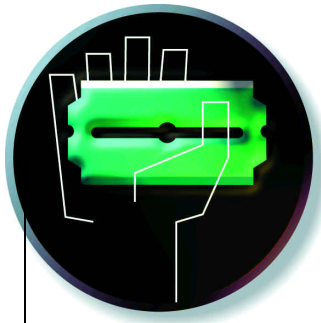
Key: ● Yes ○ No

Table of Features



Manufacturer	Psion	Sharp	Sharp	Sharp	Sharp	US Robotics
Model	Siena	ZR 5800	IQ8920	4550	PB-EE1	Pilot 5000
Price (RRP excl. VAT)	£144.64 (512Kb)	£451.06	£279.99	£89.99	£69.99	£195
Phone contact	0990 143050	0800 262958	0800 262958	0800 262958	0800 262958	01734 228200
Fax	0990 561046	0161 205 7076	0161 205 7076	0161 205 7076	0161 205 7076	01734 695555
Size (w x d x h in mm)	170 x 100 x 254	170 x 100 x 25.4	155 x 97 x 23.9	138 x 84 x 18	122 x 82 x 13	120 x 80 x 16
Batts (reg and backup)	2 x AAA & CR1620	2 x AA & 1 CR2032	2 x AAA & 1 CR2032	3 x CR2032	2 x CR2032 & CR2016	2 x AAA
Weight (with batteries)	183g	390g	300g	153g	114g	160g
Processor	NEC V30H	Sharp 16-bit	Proprietary	Proprietary	Proprietary	Motorola 68328
Screen size (in mm)	65 x 45	130 x 69	85 x 60	N/A	N/A	N/A
Screen res (w x h in pixels)	240 x 160	320 x 240	240 x 168	119 x 32	96 x 64	1
Display cols (greyscale(s))	2	1	1	1	1	1
Standard/max memory	512Kb or 1Mb	2Mb	512Kb	128Kb	32Kb	512Kb
No. of keys	56	77	87	81	Touch screen	4
Quoted batt life (cont. use)	40-60 hours	70 hours	70 hours	1200 hours	500 hours	3 months
Expansion slots	1 RS232 port	1 x Type II PCMCIA	●	○	○	●
Pen based	○	●	●	○	●	●
Word processor	●	●	●	○	○	●
Spreadsheet	●	●	○	○	○	○
Notepad/jotter facility	○	●	●	●	●	●
Handwriting recognition	○	○	○	○	○	● Graffiti
Spell-checker	○	●	●	○	○	○
Infra-red capabilities	●	●	●	○	○	○
Windows PC Link	●	●	●	●	○	● included
Mains input	○	●	●	○	○	○
DTMF (tone phone) dialling	○	●	○	○	○	○
Email/web browsing ability	○/○	email ●	○	○	○	○
Audio recording	○	●	○	○	○	○

Key: ● Yes ○ No



Apple: to be or **net** to be?

That is the question currently facing Apple. A sensible internet strategy could be its saviour, generating enough profit to fund the next generation of the MacOS, considers Dean Swift.



Apple is one computer manufacturer for whom internet strategy may prove to be of life or death importance. The internet offers a massive opportunity for Apple to retain its importance as a company, and to place itself once again at the heart of personal computing. Although the company has started to put itself back into a position of profit, it is only by placing itself at the forefront of new, emerging, markets that it can hope to gain market share and achieve the level of profits it needs to develop the next generation of the MacOS.

Apple's strategy can be summed up as a commitment to open standards coupled with an integration of its core technologies into the internet. So if this means working with other companies, Apple is prepared to bite the bullet and form alliances. As Larry Tesler, head of AppleNet, put it: "Apple is committed to working with any vendor that's truly committed to platform-neutral standards, which is what the internet is all about." This even extends to working with Apple's traditional enemy, Microsoft, to implement support for ActiveX, possibly even integrating it into the MacOS itself.

While adopting open standards offers a way for Apple to move into the mainstream, it also presents it with a challenge. After all, if all you have is open standards, how do

you differentiate your product sufficiently to make it the most attractive platform for internet use? The obvious answer would be to take the approach to which Microsoft is committed: "Embrace and Extend". However, this approach of taking open standards and building semi-proprietary ones on top of them is not open to anyone without the commanding market presence of the Redmond giant, and for Apple in particular it would look ridiculous.

Instead, Apple is attempting to differentiate its internet products by applying leverage in two key areas in which it has long had expertise: ease of use, and multimedia. While no-one doubts that Apple is (and always has been) strong in both areas, grafting them onto the notoriously complex internet while retaining cross-platform compatibility and a commitment to open standards is going to be a fantastically difficult job.

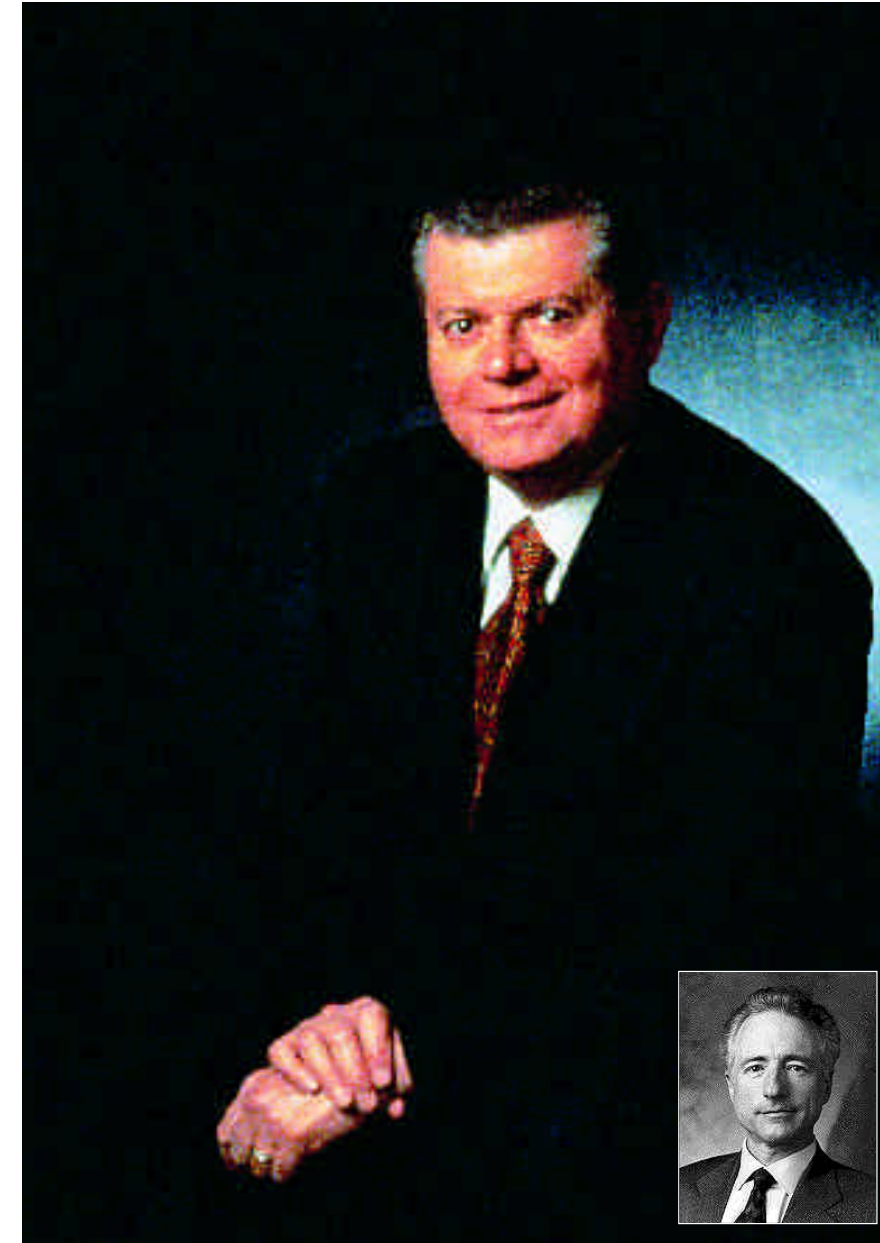
To make matters more difficult, Apple has taken the decision to compete in all three areas of internet activity: servers, accessing and authoring. While this approach means that there will be a comprehensive Apple-based internet solution, the potential exists for the company to spread itself too thinly and produce technologies which fail to sufficiently differentiate themselves. But as

we shall see, so far the strategy looks more like a success than a failure.

Technologies

Although almost every commentator has predicted over the years that Apple must make the transition from a hardware to a software company, the vast majority of its revenues come from hardware — primarily, the sale of desktop Macs. So it is perhaps not surprising that Apple considers itself in the business of providing internet server solutions, competing head on against both Windows-based machines and Sun, the giant of the internet server industry.

On the hardware side, you can divide Apple servers into two types: those running MacOS and those based on AIX. Apple recognised early on that while the Mac has some advantages as a server platform, the overheads involved in running a complex graphical interface meant that it wouldn't be suitable for the heaviest kinds of network traffic. In order to get around this, Apple produced the Network Server 500 and the Network Server 700 based around AIX, IBM's version of Unix. The first computers from Apple for years that are not Macs,



Main picture: Dr Gil Amelio, chairman and CEO of Apple Computer, and **inset:** Larry Tesler, appointed by Amelio as head of AppleNet

these machines are undoubtedly powerful, but as you might expect they are not really compelling as internet servers because they offer little advantage over rivals from Sun or even IBM.

Instead, it's the Mac-based servers that are the primary thrust of Apple's internet server line. Apple currently offers two internet server solutions: the 7250/120 and the 8550/132, which are based around standard Power Macs (the 7200 and 8500, respectively) but come with a bundle of software that enables users to create and publish content on the World Wide Web.

The software includes WebSTAR (from Quarterdeck) for serving web pages, RealAudio Server, Tango, and Butler SQL*

for connecting web pages with an SQL database. Also included are MacDNS, FileMaker Pro CGI to connect existing FileMaker databases to the web, and Adobe Acrobat Pro to create cross-platform .pdf files. To run a POP3 mail server from the same machine, all you have to do is download and run Apple Internet Mail Server which is freely available from Apple's web site at www.apple.com. All the software is easy to set up and administer, and the inclusion of Adobe PageMill in the same bundle means that everything is available for a small company to create and serve web pages.

Compared with running a Unix or Windows NT-based server, the Macs are

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incredible: you can have a fully-functioning server up and running within a couple of hours of opening the box.

Apple's handicap, however, is the very thing that makes its servers appealing: the MacOS. While MacOS makes Apple internet servers attractive for projects that require quick setup and low maintenance, the lack of protected memory and pre-emptive multitasking weakens performance and raises questions about their suitability for mission-critical uses. The MacOS also exacts a performance penalty compared to Unix-based machines, and even Larry Tesler has admitted that the MacOS is "not the highest performance server-operating system".

Yet because of the ease of setup, Apple's servers make sense where cost is an issue, especially for a small-to-medium sized company that wants to serve its pages in-house



OpenDoc

Unless you've been living in cloud cuckoo land for the past few years, you'll have heard something about the shift from application-centred computing to a document-centric model. On the Windows platform the best-known implementation of this is OLE, from Microsoft. Originally seen as a kind of live cut and paste, OLE has mutated into a full system for linking and embedding small objects from one application into the documents from another. More recently, OLE has formed the foundation of Microsoft's internet applet embedding system, ActiveX.

Although OLE exists on the Mac, it's not widely supported outside Microsoft's office suite and has little relevance to Apple's overall strategy. Instead, the Mac world is moving towards OpenDoc, a solution originally developed by Apple and supported by IBM and the X-Consortium.

OpenDoc represents a far more radical shift than OLE as it goes much further along the road to abandoning the traditional large application. OpenDoc consists of documents, parts and containers. Users create their own applications by gathering parts into documents, with each part having an associated set of services that let the user perform various operations using that part. Containers, on the other hand, are more like traditional applications that have been adapted to "contain" OpenDoc parts and documents.

Support from application developers has been patchy so far, with the main supporters on both platforms being Corel and Claris. But smaller developers have begun to produce OpenDoc parts which offer innovative features at low prices, and this level of innovation has been one of the most promising aspects of the Mac market during the past few months.

OpenDoc has some clear advantages over OLE. First of all it is truly cross-platform, with development kits available for Mac, Windows 95, OS/2 and Unix. This means that for corporate environments carrying out in-house development that supports all of the above, OpenDoc is the only real choice. Because of its basis in CORBA (Common Object Request Broker Architecture) it fully supports inheritance and is a true object-orientated environment, making it easier to develop for, and offers support for overlapping parts, irregular-shaped objects, and the ability to have more than one object active at once. Finally, and perhaps most crucially of all, it offers support for embedding OLE 2.0 components within OpenDoc documents: in other words, developers who convert their applications to OpenDoc get free support for OLE. Given this, and the support that OpenDoc has received from large developers such as Corel and Claris, it would be surprising if OpenDoc didn't gain a reasonable following in both the Mac and the Windows communities.





Although Cyberdog holds potential long-term significance, it nevertheless relies on a system extension that currently has not been taken up by many Mac users

and yet doesn't have a lot of resources to dedicate to the task.

QuickTime

Although the biggest chunk of Apple's revenues come from hardware, it's the company's software which remains its crown jewels. One of the keys to this has been the success of QuickTime, the cross-platform multimedia architecture that includes support for video, MIDI, and 3D objects. While QuickTime has always been a popular choice for encoding video on CD-ROM it has also become a standard for video playback on the web, especially as QuickTime support is bundled into Netscape Navigator 3.0.

QuickTime offers big advantages over competitive formats, firstly because of its cross-platform heritage — it's available for Mac, Windows 95, NT and 3.1, and even (in beta form) for OS/2 Warp. Secondly, with its recent upgrade to version 2.5 it has been optimised for the web, including a fast start feature that allows movies to begin playing before they have been fully downloaded.

Largely due to these two advantages, support for QuickTime has been incorporated into the Java Media

Newton on the net

In retrospect, one of the darkest clouds of the failure of Apple's proprietary online service, eWorld, has proved to be a silver lining for Newton. At the time of eWorld's demise, Apple had very little to offer its Newton customers, who had previously been tied to using eWorld for email. So to ensure that the Newton had a viable email solution, Apple was forced to put extra development effort into connecting Newtons to the internet, and quickly released the Newton Internet Enabler. This system extension enabled Newtons to connect to TCP/IP networks via PPP, and allowed application developers to create programs which collected mail via POP3, read usenet news, and even browse web pages.

This development effort has meant that Newton probably has the best selection of internet software of any PDA (personal digital assistant), and it has been notable that every Apple briefing on the internet in the past year has featured Newton heavily. The next-generation MessagePad, the MP2000, is being marketed as a mobile communications device for professional business users largely because of its internet connection abilities.

Apple has even talked of MessagePads as network computers and is working on an implementation of Java for Newton. However, because of the limited amount of memory in current Newton models, it is unlikely that they will be Java-enabled.

Framework; an attempt by Sun to expand the specification of Java and enable the language to become more of a web-based multimedia scripting environment.

The only real barrier to QuickTime's acceptance as the *de facto* multimedia standard for the internet may ironically come from Apple itself. In her recent keynote speech at Apple Expo, Chief Technology Officer Ellen Hancock stated that Apple was actively looking into ways of making money out of QuickTime as part of its commitment to reduce its dependency on hardware sales and boost software revenue.

If the pricing model on which Apple eventually settles is too much for the market to bear, then QuickTime will lose out. If, on the other hand, Apple can't make money from one of its best and most successful technologies, then it's unlikely that it will be able to make a successful transition to a software-based company model.

Internet products

Accessing the internet is another area where Apple is juggling with the need to support industry-wide standards and yet produce innovative products. Macs are generally easy to configure to access the net and there is a full range of Mac web browsers, including Netscape Navigator

and Microsoft's Internet Explorer. But Apple has offered another option for anyone using its OpenDoc component software system: Cyberdog. This is a suite of components that allows anyone to embed live information from the net into an OpenDoc document, whether that information is usenet news, a web page or a mail document. Cyberdog can also work as a standalone mail, news and web browsing application but it doesn't fare too well when compared with Navigator or Internet Explorer. Cyberdog wins out as a way of using the net as a source of live information for complex documents.

Apple has already announced and outlined technologies that, despite not being at the stage of shipping products yet, are nevertheless indicators of its future direction. The first of these to see the light of day as a final product will probably be HotSauce, a technology that allows users to browse the web according to preset context criteria.

HotSauce utilises an indexing technology called MetaContent Format (MCF) that enables information providers to include far more of the contextual information vital to getting accurate search requests, and the company hopes to evangelise this technology to information providers during the next year.

Also on the horizon are extensions to OpenTransport (the networking architecture built in to MacOS) that will allow faster and more efficient TCP/IP connections and a built-in personal web server. While neither of these are spectacular enhancements to the MacOS, they do indicate Apple's determination to integrate the net firmly into the operating system at its core, rather than leaving it to Netscape and Microsoft to



Welcome to Cocoa

Why Apple must compete

The Mac makes up a surprisingly high proportion of the internet-connected world. While the overall market share of the Mac hovers at between eight and ten percent, 20 percent of internet access is from a Mac. This high proportion is partly due to the historical fact that Macs have been very strong in the US education market, which formed the core of much of the early internet, and also because Macs were initially easier to connect to the net than Windows machines. And, as might be expected from their heritage as the machine of choice for designers, they are strongly represented as web design machines, with over 40 percent of web graphics and 20 percent of web pages created on the Mac.

This is a situation that Apple has recognised as giving them an advantage, albeit a small one. Having effectively lost the desktop operating system wars, at least for general business use, it's an early lead of which Apple must take advantage if the company is to survive. The key area of growth for personal computers over the next few years is liable to be the home, and the number of online households in the world is set to double over the next two years. Given this, the bottom line is that the company must ensure that the best tools for accessing the net are available on the Mac if it wishes to prevent the Mac's market share from sliding.



Apple and Java, the best of friends



Apple is firmly committed to Java. In fact, because of its cross-platform portability, Java has become one of Apple's best friends. The company is determined to become, as Larry Tesler has put it, "A major player in all things Java."

The company is committed to delivering support for Java across all three of its platforms (Mac, Newton and Pippin), with integration into the operating systems as tight as possible. The first stage of this is the release of MacOS Runtime for Java (MRJ). This is an extension to the Mac system that allows any application to interpret Java code, assuming that the programmers have integrated support for MRJ. Ironically, one of the first developers to utilise MRJ is Microsoft, whose Internet Explorer 3.0 uses MRJ to interpret Java applets.

The approach of integrating Java into the OS has several advantages. First of all, end-users never have to consider whether or not Java is installed — in fact, many users will never realise Java is running. For developers, there is the advantage of not having to re-invent the wheel by creating a Java interpreter themselves for each new application. And, there is the additional advantage of reducing the memory footprint of their applications.

The next step is to integrate OpenDoc and Java Beans, the extension to Java that allows the language to be used in component software. Sun and Apple have committed themselves to ensuring that Java Beans works inside OpenDoc containers, and also that OpenDoc parts work inside any Java Bean that can contain other components. This means that developers can use Java Beans to develop small applets and use the framework of OpenDoc to tie these together into complex applications.

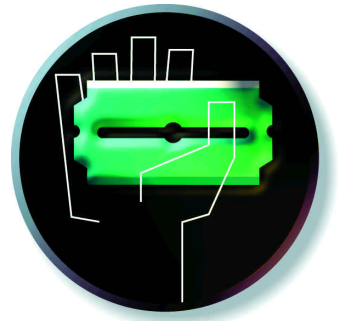
Sun and Apple's close relationship, forged when the two companies were involved in preliminary merger discussions last year, has meant that Apple has begun to contribute to the evolution of Java. For example, Sun's proposed Java Media Framework API incorporates QuickTime to add multimedia to Java applets. Given the closeness of this relationship, you can expect Java to be a key part of Apple's strategy for years to come.

"own" internet access from the Mac.

Overall, Apple's internet strategy has so far yielded little in terms of totally new products. The servers are based on ordinary Macs, QuickTime is a long-established standard, and Cyberdog, while potentially significant in the long term, relies on a system extension (OpenDoc) that has not as yet been taken up by many Mac users. The next year will be the most crucial for Apple's strategy, as it must integrate the

internet firmly into the operating system while continuing the ease of use for which the company is justly famous. If you were writing a school report for Apple's internet strategy, the grade would undoubtedly be a C- "Shows some early promise, but must be careful to maintain concentration".

If the company manages to continue creating new technology while ensuring its cross-platform credentials, the future should be bright. ■



Web wonder

Common Gateway Interfaces can be used to produce dynamic web pages. Simple CGIs are not hard to write, so have a go with Ian Wrigley in his CGI workshop, part 1.

JavaScript is a great solution to many problems on the web, as is Java — we'll be looking at Java in more detail over the coming months. However, there are some solutions where the only sensible thing to do is to use a CGI. The acronym, rather puzzlingly, stands for Common Gateway Interface, but in fact a CGI is just a program which runs on the web server. Normally it will process some input from the browser, such as the contents of a form, and send out a web page in response.

The beauty of CGIs is that they can be used to produce truly dynamic web pages, customised to an individual browser's preferences. And they are not too hard to write: if you have any programming experience, a simple CGI should provide you with few worries. This workshop will take a look at creating simple CGIs to do things like count the number of hits to a particular link. Next month we'll be examining more complex CGIs, including some to process input from a form and to output different pages depending on the browser being used; information which the CGI can discover automatically, rather than having to be given an explicit instruction.

Basic principles for CGIs

A CGI program can be written in just about any computer language, although typically C or Perl is used. The C language is one of the most popular programming languages around, and is the one we'll use for this



month's examples; Perl (Practical Extraction and Reporting Language) is a language popular on Unix systems, although it can be found on just about any operating system you care to name. Some of next month's examples will use Perl. Although Perl scripts run more slowly than those written in C, due to the fact that Perl is interpreted rather than compiled, it has many useful functions for easily handling strings and lists of values. If you're not a C programmer, don't worry: the principles we'll be examining this month are the same whatever programming language you use.

Writing a CGI really isn't as difficult as you might think when you first look at the

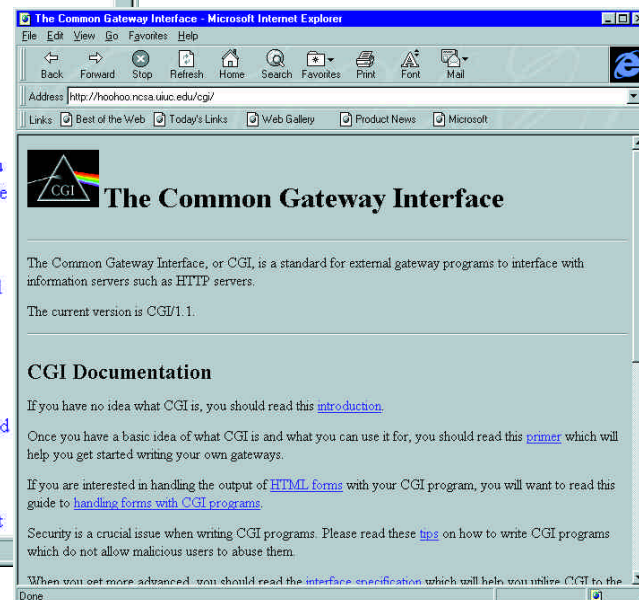
problem. You might suspect that you need to interface, in some scary way, with the web server software but all your program needs to do is write data to the standard output stream. In other words, to use `printf()` or whatever the print command is in your chosen language. This data will be passed on to the browser by the web server, so the CGIs we develop here should work just as well on a Windows web server as on one running on a Unix system. There is a slight trick, though. Because the server can send several different types of information to the web browser, your CGI must first tell the browser that it's going to receive standard HTML. You do this by

p232 >



Left The Foodpages site uses a number of CGI scripts to search for restaurants

Below A host of CGI information exists on the web itself



making sure the first thing printed out is the string "content-type: text/html", followed by a carriage return. After that, you can just print out standard HTML code — this will be displayed by the recipient as though it were a normal HTML page. The program in Fig 1, for example, simply prints out a message on the screen. This could have been produced as a standard HTML page, but we've produced it as a CGI to show that no extra special work is needed. As a welcome result of this, it is fairly easy to test your CGIs before you put them in place on the web server. They print to the screen so you can see exactly what HTML the software is outputting. Don't forget that "content-type" line. Otherwise your program may appear to work perfectly when you test it, but will produce a server error when you run it as a CGI.

To install the program from Fig 1 on your web server, you need to compile it (of course!) and then place it in the correct location in your web server's directory. For most Unix-based servers, this is in the cgi-bin directory, but you should check with whoever runs your server to find out the actual location. Once it's there, you can access it simply by giving its location to your web browser. For instance, on my system I installed the program as "pcwprogram1" in my cgi-bin directory, and I can view the

output by telling my browser to go to www.widearea.co.uk/cgi-bin/pcwprogram1.

Counting hits

A CGI doesn't need to print out a page itself. Instead, it can perform some function and then send the browser off to another

page — or, indeed, to another site. To do this, rather than printing out an HTML page, your software should print out [Location: www.somewhere.co.uk/somefile.html](http://www.somewhere.co.uk/somefile.html). This automatically redirects the browser to the new page, and the user doesn't even need to know that your CGI has run. We'll use

Fig 1 Message printout

```
#include <stdio.h>

int main(void)
{
    /* First the all-important header information */
    printf("content-type: text/html\n\n");

    /* Now the HTML itself */

    printf("<HTML><HEAD><TITLE>Hello, world!</TITLE></HEAD>\n");
    printf("<BODY>\n");
    printf("<H1>Hello, world!</H1>\n");
    printf("</BODY></HTML>\n");

    return 0;
}
```

this technique to produce a program which counts how many people click on a given link on your page. The software should add one to the count of clicks and then redirect the user to the required page. For our example, we'll redirect to another CGI, which will read in the number of hits and will print that out, so you can tell that the software is working.

Furthermore, we'll make the software easily configurable by storing the location the user should be taken to in a separate file — so you can change the location simply by editing the file. Many commercial sites use a similar technique to count the number of hits an advertisement has received before taking the user on to the advertiser's site. A program written for such a task will be rather more sophisticated than our example, since it will probably record extra information in a log file and is likely to be able to deal with clicks from several different adverts. Next month, we'll be looking at how to accept input from the browser, at which point you should be able to extend the program to perform tasks like this.

Our hit-counter is shown in Fig 2. Even though it's fairly simple, it's worth going through it to demonstrate how we do each of the tasks. First we include the `stdio.h` header — needed since we're going to use files, and to print something else — and the `stdlib.h` header, since we may call the `exit()` function. Then we define the names of the two files we'll be using: one to count the hits, and another to find out the redirect location. We have to use a file to store the hit count, since the CGI is run only when the user clicks on a link — it doesn't run all the time, and therefore the data cannot be stored in a variable. Notice that we need to give the full path to the files, since different web servers put CGIs in different places, so we can't rely on using a relative path name.

Next, we try to open both the input and output files. If we don't succeed in opening the hit count file, that's probably because it doesn't yet exist, so we call a function to create the file for us. This function returns a pointer to the file so we can use it to open the file for reading. If either of the file pointers is NULL, we either couldn't open the location file or we failed in creating our hit count file — so we redirect the user to an error page on our server, and exit the program. (A call to `exit` automatically closes any open files, so it doesn't matter if one of the files has been successfully opened.) The redirection is accomplished by sending the

Fig 2 A hit-counter

```
#include<stdio.h>
#include<stdlib.h> /* For exit() */

#define REDIRECTFILE "/export/home/ian/redirect"
#define HITCOUNTFILE "/export/home/ian/hitcount"

/* Function prototype */
FILE *createneWHtfile(void);

int main(void)
{
    FILE *predirect, *phitcount;
    long numberofhits;
    char redirect[255];

    printf("content-type: text/html\n\n");

    preredict = fopen(REDIRECTFILE, "r");

    if ((phitcount = fopen(HITCOUNTFILE, "r+b")) == NULL)
        phitcount = createneWHtfile();

    if (predirect == NULL || phitcount == NULL)
    {
        printf("<HTML><HEAD><META HTTP-EQUIV=REFRESH ");
        printf("CONTENT=\n0: URL=http://www.somewhere.co.uk/error.html\n");
        printf(">");
    }

    printf("</HEAD></HTML>");
    exit(1);

    /* Now we know that both files are open, so... */

    fscanf(phitcount, "%li", &numberofhits); /* Read it in */
    numberofhits++; /* Add one to it */
    rewind(phitcount); /* Move back to beginning of file */
    fprintf(phitcount, "%d", numberofhits); /* Write it back out */
    fclose(phitcount); /* Close the file */

    /* Now for the redirection */

    fscanf(predirect, "%s", redirect); /* Read in the location */
    printf("<HTML><HEAD><META HTTP-EQUIV=REFRESH ");
    printf("CONTENT=\n0: URL=http://%s\n", redirect);
    printf("</HEAD></HTML>");
    /* Send to the browser */
    fclose(predirect); /* Close the file */

    return 0; /* And we're done! */
}

FILE *createneWHtfile(void) /* To create the file */
{
    FILE *newfile;

    newfile = fopen(HITCOUNTFILE, "wb");

    if (newfile != NULL)
    {
        fprintf(newfile, "0"); /* Put a zero in the file */
    }
    fclose(newfile);
    return fopen(HITCOUNTFILE, "r+b"); /* Pass back the pointer */
}
```

Fig 3 Hits in, value out

```

#include <stdio.h>
#include <stdlib.h> /* for exit() function */

#define HITCOUNTFILE "/export/home/ian/hitcount"

int main(void)
{
    FILE *hitcountfile;
    int hitcount; /* For the number of hits */

    printf("content-type: text/html\n\n");

    printf("<HTML><HEAD><TITLE>Hit count</TITLE></HEAD>\n");
    printf("<BODY>\n");

    if ((hitcountfile = fopen(HITCOUNTFILE, "r")) != NULL)
    {
        fscanf(hitcountfile, "%d", &hitcount);
        fclose(hitcountfile);

        printf("You have received %d hits! <P>\n", hitcount);
    }
    else
        printf("ERROR! <P>\n");

    printf("</BODY></HTML>\n");
}

```

browser a META HTTP- EQUIV= REFRESH command. This tells the browser that after 0 seconds, it should go to the new page (i.e. immediately).

It's important that you check for success when you're opening files, otherwise your program will probably crash. And, if you're running on a Unix system, it will probably result in a large file known as a "core dump" being generated.

Now, since both files have been successfully opened, we can read in the current number of hits that have been made, add one to that value, and write it back out over the previous value. We then read in the location to which the browser should be redirected, print that out in the required format, close the two files and we're done.

The program in Fig 3 works in a similar manner: it reads in the number of hits from the hit count file and, assuming it's been successful in that, writes the value out in the middle of an HTML page. (Spot that "content-type" line! I know I keep going on about it but when you first start creating CGIs it will probably be the most common mistake you'll make.)

Finally, Fig 4 has the HTML page that starts the whole thing going. Enter and compile the two programs, save them in the relevant place on your server, create a text file containing the location of the second program, save that as your "location" file, and you're ready to go.

Adding input from a page

So far, our CGI only knows about one

Fig 4 — start the whole thing going

```

<HTML>
<HEAD><TITLE>Test of hit count \program</TITLE>
</HEAD>
<BODY>
Click <A HREF="www.somewhere.co.uk/cgi-bin/hitcounter">here</A> to add
a hit to the counter. <P>
</BODY>
</HTML>

```


particular link on the page. If we wanted to count how many times two different links had been hit, we'd have to write two different programs, which is inefficient to say the least. It would be far nicer if the program could actually look at which link had been clicked on, and increment the value in a different file for each different link.

To do this, we need some way of accepting input from the browser. We'll go into this in more detail next month, but for now we'll deal with the simplest way of getting information into a CGI, using STDIN. Remember, we said that when your CGI wants to output a file it should just write to the standard output. Well, the same goes for getting input; in the simplest case it can merely read from standard input. Obviously the user can't enter values while the CGI is actually running as by that time the page has already been sent. But what it can do is read values from the command line, as if they had been entered after the program's name. If you were writing a normal C program to accept input from the command line — if, for instance you were writing a C program called "test" which required one argument so it would be executed by typing "test sampleargument", your program would use ARGV[] to accept the data. And that's exactly what a CGI can do.

If your web page calls a CGI in the form "cginame?argument", then the "argument" portion is passed to the CGI as though it were the first command-line argument. Indeed, if you want to pass more than one argument, you can do so by calling the CGI with the command "cginame?firstargument &secondarg&thirdarg" and so on.

Armed with this information then, we can produce the program in Fig 5. It's fairly similar to the program in Fig 2 but this time it reads in the first command line argument and uses that to determine which file it should open. For clarity, we have not used a separate file for the redirection destinations, but you should be able to do so fairly easily if you want.

Fig 6 shows the HTML file that we used to call the program. It is fairly

Fig 5 Reads the first command line argument

```
#include<stdio.h>
#include<stdlib.h> /* For exit() */

#define HITCOUNTFILE "/export/home/ian/hitcount"

/* Function prototype */

FILE *createnewhfile(void);

int main(int argc, char *argv[])
{
    FILE *phitcount;
    long numberofhits;
    char redirect[255];

    printf("content-type: text/html\n\n");

    if ((phitcount = fopen(HITCOUNTFILE, "r+b")) == NULL)
        phitcount = createnewhfile();

    if (phitcount == NULL)
    {
        printf("<HTML><HEAD><META HTTP-EQUIV=REFRESH ");
        printf("CONTENT=\n0;
URL=www.somewhere.co.uk/error.html \n
> ");
        printf("</HEAD></HTML>");
        exit (1);
    }

    /* Now we know that the file is open, so... */

    fscanf(phitcount, "%li", &numberofhits); /* Read it in */
    numberofhits++; /* Add one to it */
    rewind (phitcount); /* Move back to beginning of file */
    fprintf(phitcount, "%d", numberofhits); /* Write it back out */
    fclose(phitcount); /* Close the file */

    /* Now for the redirection */

    printf("<HTML><HEAD><META HTTP-EQUIV=REFRESH ");

    if ( *(argv[0]) == '1' )
        printf("CONTENT=\n0; URL=http:www.somewhere.co.uk/\n">");

    if ( *(argv[1]) == '2' )
        printf("CONTENT=\n0; URL=http:www.somewhereel.se.co.uk/\n">");

    printf("</HEAD></HTML>");
    /* Send to the browser */
    return 0; /* And we're done! */
}

FILE *createnewhfile(void) /* To create the file */
```

(... listing continued overleaf)

Fig 5 (continued)

```

{
    FILE *newfile;

    newfile = fopen(HITCOUNTFILE, "wb");

    if (newfile != NULL)
    {
        fprintf("%d", 0L); /* Put a zero in the file */
        fclose(newfile);
    }
    return fopen(HITCOUNTFILE, "r+b"); /* Pass back the pointer */
}

```

Fig 6 The file that calls the program

```

<HTML>
<HEAD><TITLE>Test of hit count program</TITLE>
</HEAD>
<BODY>
Click <A HREF="http://www.somewhere.co.uk/cgi-bin/hitcounter?1"
>here</A> to add a hit to the counter. <P>
Or click <A HREF="http://www.somewhere.co.uk/cgi-bin/hitcounter??2"
>here</A>
to add a hit and go somewhere else. <P>
</BODY>
</HTML>

```

Fig 7 Homework

```

<HTML>
<HEAD>

</HEAD>
<BODY>
<FORM action="/cgi-bin/yourcgi here" method="GET">

<P>Type in your name here <INPUT TYPE="text" NAME="yourname" VALUE=""
SIZE=30> and click <INPUT TYPE="submit" NAME="submit" VALUE="Submit">

</FORM>
</BODY>
</HTML>

```

similar to the other HTML pages we've seen, but notice how we call the CGI, using that "question mark notation" to pass the value of command-line arguments. As we'll see next month, this basic system can be used to do far more than just pass a fixed value from an HTML page. Indeed, it's the basis for many CGIs that process large amounts of data from forms. Nevertheless, there are some subtleties involved which means it's not quite as simple as at first it might appear.

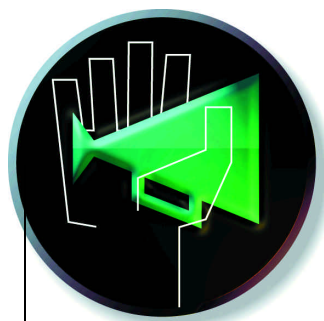
Try this at home

Finally, here's a challenge before you read

the next issue of *PCW*: using what we already know, try creating a simple CGI which prints out the value of the command-line argument that it's passed when the user hits the "Submit" button from the HTML page in Fig 7. That should give you a few clues as to how we'll have to deal with input from forms.

PCW Contact

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net.news

Around the web world with PJ Fisher.

jDoc in the house

A new US company has launched Net-It Now, a Java-based product which automatically converts Word, PowerPoint, Lotus 1-2-3 or Vision documents for presentation intact. It operates on web browsers or other Java-compliant document "containers" like NC operating systems with a Java Virtual Machine.

The company is claiming significant file reductions (around 33 percent of original Word documents) with only a small (19Kb) player needed to run the documents. If successful, it could mount a serious challenge to Adobe's Acrobat, recently

upgraded for use on the web.

Unlike Acrobat, which uses a version of PostScript, Net-It Now uses Java to compile pages on the web. The process involves the company's jDoc display technology which dispenses with the need for browser plug-ins. The jDoc architecture is written as an extension to Java and consists of three jDoc components: Document, Player and API. The Document contains information about an original page, including its fonts and graphics; the Player executes the documents; and the API allows external applications to save

documents in the jDoc format. The format supports vector graphics as well as JPEG and GIF files, said to speed download times.

For the moment, Net-It Now is targeting the corporate world where most distributed documents are in software suites.

Priced at \$99 for a single-user licence, Net-It Now is available as a 30-day trial package from the company's web site.

www.net-it.com



Firewall fends off bad applets

The growing number of Java applications and ActiveX controls available on the web poses security problems for corporate networks and individual users. Finjan Software has announced firewall

configurations for networks and single-user PCs, to guard against attacks from such sources. One, SurfinShield, is claimed to be the world's first personal firewall.

On the network, SurfinGate scans Java applets as they are downloaded to the gateway. "It offers thorough security against internet downloadables together with centralised control over intranet user access," said president, Shlomo Touboul.

The software can sit on corporate servers and protect entire networks, or on individual PCs as a personal firewall. After scanning, it

assigns applets a "digital signature" on-the-fly and gives them an Applet Security Profile (ASP) based on content and anticipated behaviour. This then denies or allows entry depending on corporate security policy.

A database of known bad applets, supplied by Finjan, can be modified and used as a checklist against those which may be downloading from anywhere on the intranet. Finjan will also protect against applets coming in through the back door via email and data files.

The corporate version is available in the US at \$995 for a ten-PC licence. SurfinShield 2.0 is available for \$49 from the company's web site. Both packages run on Windows 95 and NT.

www.finjan.com



Fusion freedom

NetObjects has announced version 2.0 of Fusion (for Windows), its revolutionary object-based web authoring package.

Fusion has been hailed as the first HTML tool to put design at the forefront of its product and NetObjects is keen to maintain momentum by building in new features, including the ability to import entire web sites and edit them within Fusion.

DTP-style master documents are brought to web-site creation for the first time with MasterBorders. This allows

identical elements to be placed on each web page automatically. It can also be used to create frames across a web site.

A number of active elements which normally require programming are now available from a menu. These Fusion Components include CGI formhandlers, Java-based DynaButtons (which have dynamic actions attached) and Rotating Billboards, also based on Java.

Significantly, NetObjects is about to publish an API, opening up Fusion to third-party developers to create their own Components.

Version 1.0 has just been released to Mac users, potentially to give NetObjects access to a large pool of computer-savvy designers eager to "get into" the web.

www.netobjects.com

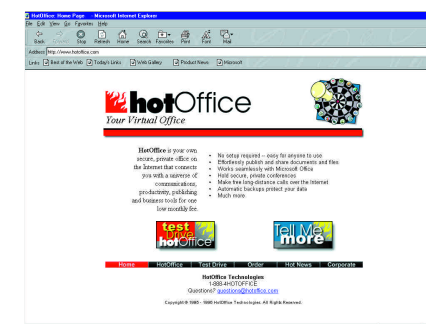


HotOffice — a cool new way to work

A world dominated by small entrepreneurial businesses, using only the internet as a base, is the dream behind the formation of HotOffice.

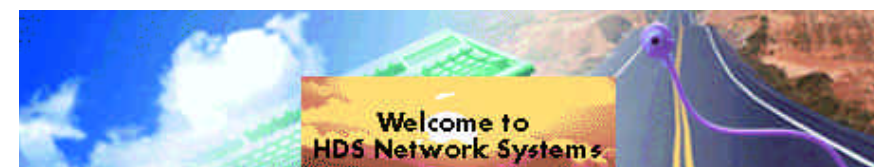
This web-based virtual office is designed to bridge the internet, intranets and conventional LANs using tools like MS Office or other popular office suites, without being locked into permanent premises. HotOffice software is specifically designed to work with Microsoft applications.

Due to be commercially available by spring, HotOffice works as an interchange centre where users can log in, talk to



colleagues and share documents on the web without ever having to come into contact with each other.

www.hotoffice.com



Navio Navigator finds its way to HDS NCs

As part of an overhaul to the OS shipped with its NCs (network computers), HDS has included the Navio Navigator from Netscape as its browser of choice.

Navio is a cousin of Netscape Navigator but uses less memory while retaining all of the original browser's functionality. Navio is integrated into netOS, the operating system

which runs on the HDS workstations.

netOS v2.0 will emulate standard MS Office applications through an improved set of terminal emulators. HDS has signed a deal with Motorola to license netOS to its PowerPC-based workstation and has recently sold intranet systems to NatWest.

www.hds.com



Arrive on time

Another start-up company is offering PC users personalised entertainment and information from the internet.

The IFusion Com Corporation is testing its Arrive service, which will be free to anyone with internet access.

It takes data from established online services like CNN and Epic Records, and combines them into a multimedia display, viewable within web browsers. A remote control unit takes the user to different "channels" on the service.

A version of the software will also be available to companies wishing to run their own news channels on intranets.

www.arrive.com

Small Psion access to the big web world

Psion users can now get onto the web. The new PSIMail Internet will enable email and web browsing, directly from any of Psion's PDAs via CompuServe Network Services. Any ISP can be used. If users have no account, a registration process will connect via CompuServe's own network. PSIMail costs £59.95 and is available now.

www.jp.interramp.com

Netscape stays on top

Netscape should retain 70-80 percent of the browser market for the rest of the decade, despite Microsoft's efforts to knock it from the top spot. A US report from Communications Industry Researchers states that, although Microsoft may appear to be making inroads, most people actually use Netscape and the proper measure of market share is usage, not shipments. According to sources at Netscape, the company has almost given up on the "browser war" and sees greater potential in the growing intranet market.

www.netscape.com • www.cir-inc.com

New sites for old

n A two-way web site updater has been launched by the Intermind Corporation.

For end-users it means not having to constantly re-check favourite web sites for changes. For web publishers it ensures that users will re-visit the sites, in turn generating much-needed advertising revenue. Although Intermind charges web-site publishers to use the server software, end-users will not be charged.



The software works within normal web browsers, allowing users to choose which information they wish to receive on a regular basis. When an alert tells the user that new information is available, the new message page can be displayed detailing what has changed on the subscribed sites.

Client software is available free of charge from the company's web site.

www.intermind.com

WebTamer calms web beast

n Among the web utilities unveiled at Comdex, one that stood out was from Accent International.

WebTamer is a suite of tools designed to speed up downloads, configure offline browsing, interact with web agents and work within a single interface.

The agent technology uses Java to automate personal

browsing sessions: the agent learns from the user's actions, much like a recordable macro does in a word processor. Search Agents activate multiple searches and combine the results into one report. The SiteSaver feature allows users to download whole sites as HTML docs instead of simply bookmarking them.

WebTamer also notifies users of changes to favourite web sites.

WebTamer works only with Netscape 2.0 or above but a version for IE 3.0 is under development. A beta is available for download from Accent's web site.

www.accentsoft.com



Corel Office gets the Java treatment

n Corel is putting the finishing touches to its office suite, which has been rewritten from the ground up in Java. The software is designed to run from network servers and is executed on terminals which could be either PCs or NCs.

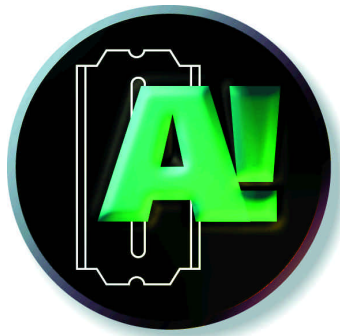
All users need is a Java-compatible web browser or the JVM (Java Virtual Machine), now being built into NCs such as Sun's own JavaStation or the IBM NetStation.

Using a web browser as a container for the applications, users click a button that opens the suite. The individual applications then open as normal, complete with all menus and buttons to hand. If running on a PC, files can be saved to hard disk, a server, or distributed across a network. For those with Java-compliant browsers, a live demo of Corel Office for Java is available for trial on the Corel web site.

Office for Java is expected for commercial release in the UK by spring.

www.corel.com





Unix and the X factor

How well is Unix catered for on the net? Keeping it in the family — how is it possible to achieve peer-to-peer networking between father and son? And CuSeeMe is keeping someone in the dark. Nigel Whitfield diagnoses and treats your web woes.

Q "We have an HP 9000 Series 700 workstation with X Windows. Is there a place on the net where I can find browsers and other internet tools for a Unix-based system? I understand the workstation already has the FTP but I don't know if it has a dial-up connection program."

A. There is a wealth of software on the internet for Unix-based systems. Many of the main computers on the internet use Unix and you'll be able to find a lot of different tools, including web browsers, graphical FTP programs and video conferencing.

If you have an FTP link, start looking at some of the large FTP sites like ftp.uu.net or src.doc.ic.ac.uk, where you'll find most of

what you need. If, however, you don't have a dial-up connection program for your computer, you'll need to get hold of one. There are free implementations of PPP for several Unix systems, so you may be able to find one for the HP 9000.

However, you are likely to find that many of the most useful programs are only available in source code, which means that you'll have to compile them to run on your computer. If you don't have a compiler you may be able to find ready-to-run versions, but that's not always as easy, and you may need to ask in one of the newsgroups where HP systems are discussed.

Since you're using Hewlett-Packard's version of Unix, the group comp.sys.hp.hpux would probably be one of the best places to start.

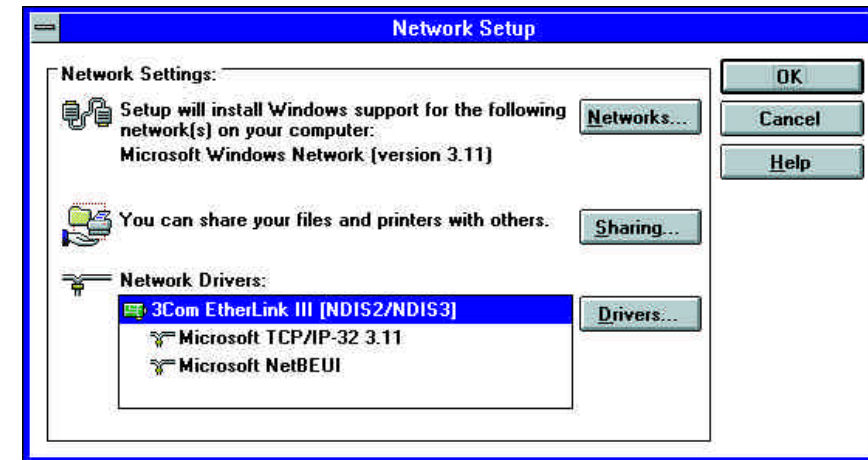
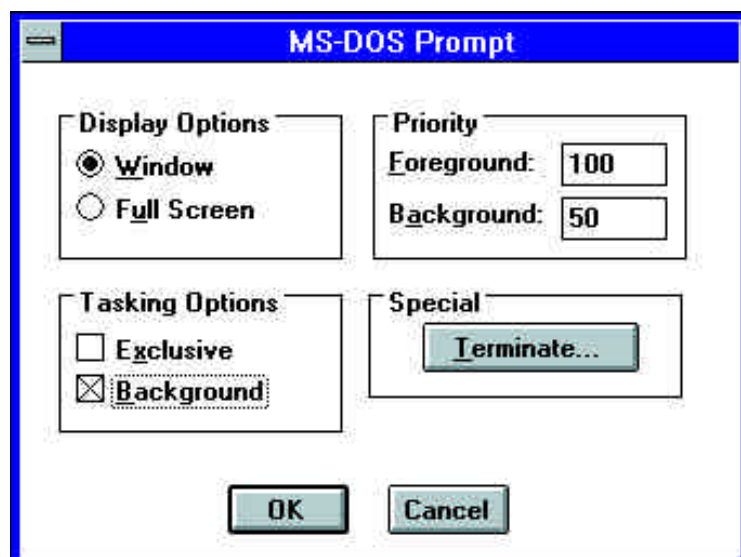
CuSeeMe query

Q. "I have a problem connecting to my White Pine CuSeeMe software, via the CompuServe CID. When I run CuSeeMe, CompuServe's dialer logs on to CompuServe okay, fires up CuSeeMe, CuSeeMe recognises CompuServe's dynamic IP host address but then throws up a GPF informing me there is a fault with the winsock.dll. Apparently CuSeeMe requires a PPP that recognises a TCP/IP-type connection, which CompuServe says is compatible with its winsock. I have successfully connected through AOL by downloading its own winsock.dll, which I load using a renaming batch file prior to logging on."

A. It's hard to diagnose a problem of this nature very easily, since GPFs can be caused by many things. You should try to upgrade your CompuServe software to the latest version, which may solve the problem.

However, you will have a particular problem using CuSeeMee with CompuServe and many other providers, which can make using the software quite tricky. To be able to establish a direct connection with another user, you need to know the internet address of the machine that they're using, and they need to know yours. With CompuServe and many other providers, you're dynamically assigned an internet address when you connect, which could be different each time. Unless you can find out the address, you won't be able to tell other people where to connect to. The White

Make sure the DOS component of mail gateways like TFS is set to run in the background, or performance will suffer [see "Stop in the name of TFS", opposite]



If you want to access the internet from a second PC, you'll need to install TCP/IP as an additional protocol [see "From father to son", page 250]

Pine version of CuSeeMee should tell you your address at the bottom of the main window, in the middle.

Another thing to check is which version of the software you have installed, as there are both 16- and 32-bit versions. Regardless of the operating system you're using, you'll need the version that matches the winsock you're using. Current versions of both CompuServe and AOL use 16-bit winsocks, although this is unlikely to be the cause of your problem since you can use CuSeeMee via AOL. Other readers may need to bear this in mind when they're setting up their own systems.

Stop in the name of TFS

Q. "We're using the TFS gateway system to connect our office email to the internet, via a UUCP link. Sometimes the system seems to just stop or to work very slowly. Is there anything that can be done to speed it up or make it more reliable?"

A. TFS isn't one of the fastest email systems, but if it's set up properly it will usually work well, albeit quite slowly, especially when messages are being collected from or sent in to your Microsoft Mail server.

The culprit is the MS-API program, which has to run in a DOS box. If your system appears to be stopping, it's likely this program isn't set up properly. You should bring it to the foreground and choose Settings from the Control menu. Then under Tasking Options make sure that the box marked "background" is checked. If it's not, you'll find that the system won't move messages to and from MS Mail unless the DOS box is in the foreground, making it harder to see what's happening in all the other windows.

The common touch

Q. "I want to write a simple program that can be called from a web server and will display the results on a page as HTML. How do I do this? I've been told that I need to learn about CGI, but where do I start?"

A. CGI is the Common Gateway Interface, which is a standard way that web servers pass information to programs and scripts from forms. The exact details of how CGI works will depend on the type of server you're using — for instance, it will be different on a Mac — but the basic principles are the same.

You can usually rely on receiving a "query string" from the web server which will be the information passed back from a form that's been filled in, in a form called URL-encoded. That means certain characters are translated to codes: a ~, for instance, is URL encoded as %7E. The 7E is the hexadecimal character code.

Ask the provider of your web server what sort of tools it provides to help you with your scripts. They may have utilities such as the `cgiparse` program which can automatically decode the query string for you, and even split it up into the different parameters that were passed. You'll also need to find out what ways of submitting information are supported. The two methods are called "GET" and "POST". With some providers you're restricted to using GET with forms on your web pages, which will usually put the query string into an environment variable. Using POST tells the server to feed the data directly into your program, which means you can receive more data but you may have to do more work to decode everything.

If it's a very simple script you may only have a single parameter, in which case life is

p248 >

much easier and you won't have to worry about splitting it up. The main concern is sending the information back to the web page. That's actually surprisingly easy: when a script is run on a web server, the information output by it is fed back to the browser. All you need to do is write a program that displays valid HTML on the screen and you're most of the way there. The only other thing you need to do is to add a couple of lines at the top of your program that will tell the browser to expect HTML. The first is a line that says

```
Content-Type: text/html
```

and the next is simply a blank line, before the HTML code for your results starts.

Dancing to the signature tune

Q. "I have a large signature on my email messages and people keep telling me off for "wasting bandwidth". Surely there's much more waste with all the junk mail and off-topic posts? Since everyone has fast modems these days, why do I have to worry about the size of my signature?"

A. You're right in as much as there is a lot of space wasted on the internet by junk mail and other things that are posted in the wrong places, but just because other people are doing things wrong, it doesn't excuse you from the rules of "netiquette".

While you might want to make your stamp on the newsgroups and mailing lists that you post to, adding a large signature — especially one with "graphics" made of letters and punctuation — isn't going to endear you to many people. It's considered good practice to keep a signature to a maximum of four lines. One person's signature may not take up much space, but there are an awful lot of people out there signing messages. If you're posting regularly to a forum, people will be able to find out all your details easily enough, so there's even an argument for only putting the signature on some of your messages. No-one wants to download several copies of something that they've seen already.

Keeping to rules may not seem important, but on the internet a lot is done simply by co-operation, and if you don't heed the requests that people make for you to trim your signature, you may find that many people will simply ignore all your messages. You can fit a lot of information in four lines: try it, and let your messages express your personality, rather than endless repetition of a large signature.

Modem manoeuvres

Q. "I have a V.32bis modem which is a little slow for accessing the web. Should I upgrade it now, or would it be better to wait and buy one of the new 56K modems that some internet providers are talking about?"

A. There's no simple answer. If you want to speed things up right away, go out and buy a V.34 modem or one of the slightly faster models that will connect at 33,600 bits per second. It will provide sterling service and will still be compatible with the 56K modems that some providers are promising to start using.

If you are tempted to wait for faster speeds, it's worth bearing a few things in mind. The modems should be in the shops around the time you read this, but there are a number of different brands offering similar speeds and they won't all be compatible. So, before you rush out and buy one, ask your internet provider whether or not it plans to support the type that you've chosen, otherwise you could find that you have to change provider to get the most from your new modem.

Secondly, the speed increase of the new modems is one way. Although you'll be able to download information from the net at twice the normal speed, information that you send will go at the same speed as a V.34 modem. If you spend most of your time looking at pages on the web, then you'll certainly notice a difference. But if you spend lots of time sending information from your computer, it may not be worth the extra expense since there'll be no increase in the speed in that direction. Unlike earlier systems that worked at different speeds in different directions, the forthcoming modems can't "swap ends" to make the best use of the line. They're really just designed to make sure that you can download quickly.

Since there's not yet a set standard for the new types of modem, it's almost certainly better not to be one of the first people to rush out and buy them. You will probably be able to upgrade — and you can upgrade some current modems from suppliers like US Robotics to the 56K speed when it's available — but check first.

Since you're currently surfing at 14,400 bits per second, the best thing you can do is probably to buy a V.34 modem right away since you'll start saving on your phone bill, and worry about the higher speeds later if you need them. If you buy a well-known

brand, you will probably be able to upgrade later if you wish.

From father to son

Q. *"My son has a PC with MSDOS 6.2/WfW 3.11 and I am investigating the possibility of his accessing my system, which has a Win95 OS, by peer-to-peer networking. Is this possible using, for instance, ethernet cards and appropriate cable for a run of approximately 20m?"*

A. Yes. It's much easier than you might expect to set everything up — you just need two network cards and some cabling. If you're not planning on adding extra machines, then you can link both systems using twisted pair cable which is a little like phone wire — make sure you buy a "crossover" cable. This is the easiest and probably also the cheapest solution.

Alternatively, you can use "thin ethernet" which looks a bit like TV aerial wire and has to have special terminators on each end. You'd have the option of adding another machine more easily, since with the twisted pair cable you'll need to buy a "hub" to have extra machines connected. Either solution will be fine for the distance you suggest, and you may be able to buy both cards and cable in a network starter kit.

In Windows 95 your network card should be detected automatically and you won't have to do much work setting it up. For home use the NetBEUI protocol will be sufficient and it's normally installed by

default. You should make sure that you use the same protocol on the Windows for Workgroups machine. To configure networks on WfW, use the Windows Setup icon and choose "Network" from the menu.

If you want to experiment with internet

programs, you'll also need to install the TCP/IP protocol on both machines, which is done from the network settings using the Add Protocol button. Even if you already have an internet connection on your Windows 95 system, you'll need to allocate another number to the ethernet card, as internet addresses (the numerical ones, like 158.152.1.65) are allocated to interfaces, rather than machines, so the number you may have from your internet provider can't also be used on the network. Instead you should choose numbers from the range set aside for private use. Allocate 192.168.1.1 to your computer and 192.168.1.2 to your son's. Why would you want to do this? Well, with a package called WinGate, you can then access the internet from either computer.

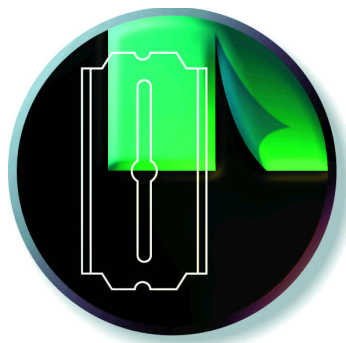


Network cards and cabling will enable DOS/Win95 peer-to-peer networking

When your son wants to look at the web, he'll connect over the ethernet to your system and from there to the rest of the world. You can find out more about WinGate from www.deerfield.com/wingate/, but remember that it may be strictly against the terms of the contract you have with your internet provider.

PCW Contacts

Nigel Whitfield is a freelance writer and maintainer of several internet mailing lists. He welcomes comments via the address nigel@stonewall.demon.co.uk; if you have questions you'd like answered, please send them to net.answers@pcw.vnu.co.uk. Please note that a personal response to every query cannot be guaranteed.



Books

Consumer surfers can check out their legal rights on the web. Read essays on how far we are from HAL, or interviews with PC bigwigs who have appeared in *PCW* over the years.

Remembering The Future: The Personal Computer World Interviews

Yes, it's shameless plug time. This is a nostalgic collection of interviews from the world's best computer magazine. There — said it. Those who have been reading *PCW* for many of its 18 years in print will recognise the names whose interviews are reprinted here. David Brake, Simon Rockman and Wendy Grossman among others were all seen in and around the *PCW* offices as it went from strength to strength.

With this book you can look back on interviews with the great and the good. And, in computing terms, they don't come much bigger than figures like Michael Dell, David Cutler, Andy Grove and, of course,

Bill Gates. Over 40 interviews make up this fascinating history of the Personal Computer (as opposed to the PC) as seen through the pages of *PCW*. Obviously highly recommended.

PJ Fisher

HAL's Legacy: 2001's Computer as Dream and Reality

Computers have always had an essential role in science fiction cinema. None more so than the HAL 9000 from *2001: A Space Odyssey*. Many of us pay a fitting homage to him by using 2001-inspired screensavers or sampled dialogue from the movie. Did any of you spot the in-joke in the recent *Independence Day*?

How far are we from building HAL? This is the central theme that runs through all of the essays collected here. The collection coincides with the "birthdate" of HAL, stated in the novel as 12th January 1997.

The writers span the scientific spectrum, forming a sort of HAL appreciation society. HAL demonstrates most of the advanced features that computer scientists have been trying to make a reality. Image and speech recognition, common-sense reasoning, the ability to recognise human emotions and the ethical implications of intelligent machines are all discussed.

When he made 2001 Stanley Kubrick was looking for drama, but at the same time he attempted to make the film as scientifically accurate as possible. In some areas he got it wrong and the sections of this book that criticise this seem to have missed the point. Perhaps it is better to let a film stand on its own merits and not over-



analyse it, lest we lose the magic Kubrick brought to the screen.

Ultimately this lavish book, illustrated with stills from the film, offers a new insight, not only from a film perspective but also from the computer science establishment. Few films have inspired so much effort and affected such a diverse group of people. HAL will some day be built, but as Marvin Minsky puts it: "If we work really hard — and smart — we can have something like HAL in between four and four hundred years. I suppose if we really get a move on we can make it by 2001."

Dave Howell

Business and Law on the Internet

Most users surf the internet with impunity, paying little attention to the material they download from the web sites they visit. Little thought is given to the legal

considerations of such actions. *Business and Law and the Internet* treads the thin line between layman's guide and professional resource, providing detailed information that both parties will find invaluable.

Initially, most users will come into contact with the legal issues surrounding the internet as consumers. Author Oliver Hance coins the term "consumer surfer": music stores, bookshops and mail order catalogues are all setting up a web presence; but buying from these sites is still a hazardous pursuit. A lot of existing consumer law applies to this form of trading — something that few net users are aware of.

The ignorance of how existing commercial law relates to the internet has reinforced users' apprehension about security and legality. As Hance points out: "It is said that trading on the internet takes place in a legal vacuum, if not complete anarchy. This is not the case at all." The lack of test cases does little more than fuel this apprehension.

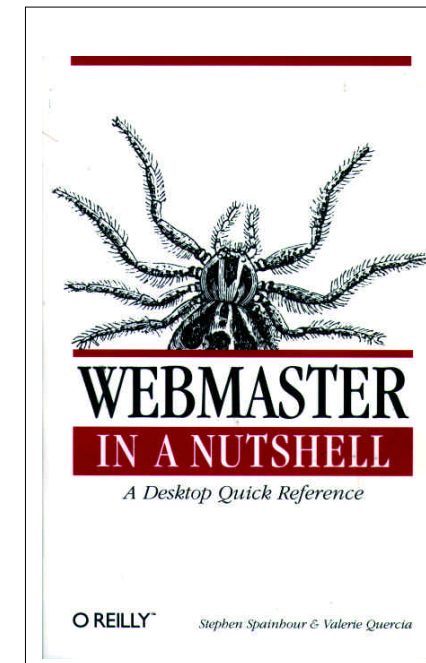
Users who wish to set up their own web site would do well to look closely at the legal position of the material they have available. Hance looks at copyright as it applies to the web page and hyperlink.

Much of the material contained in the book has, at one time or another, been touched upon in the computing and internet press. Here, however, is the first authoritative work that looks closely at American, Canadian and European law. Preceding each chapter, a series of questions are asked. They are clearly and concisely answered, followed by a summary of the material covered.

Lastly, twenty standard contracts are detailed, ranging from ISP access provider agreements to master retail sales

agreements. At times you do feel you are reading an academic text book, but on the whole there are few resources as complete and accessible as this. Whether you are a web-site administrator or a weekend surfer looking for the latest bargain, look no further for a proper guide to internet law as it stands today.

Dave Howell



Webmaster in a Nutshell

A quick mention must go to this superb new reference from O'Reilly. Destined to become as popular as its stablemate, *Java in a Nutshell*, this is an instant guide to everything the webmaster needs to have at hand. Including, of course, HTML 3.2, CGI, HTTP and Cookies — all neatly wrapped up in 300 concise pages.

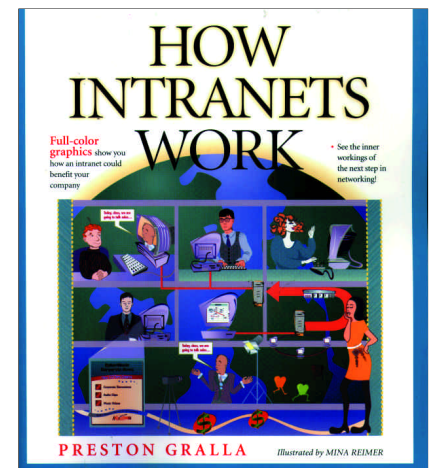
PJ Fisher

Top Ten Books/CD-ROMs

1 The Internet and World Wide Web: Rough Guide 2.0	Penguin	£5.00
2 Programming Perl, 2nd Edition	O'Reilly	£29.50
3 Microsoft Windows NT 4 Server Resource Kit	Microsoft Press	£140.99
4 Windows NT Security Handbook	Osborne	£22.95
5 Microsoft Windows NT 4 Workstation Resource Kit	Microsoft Press	£64.99
6 Creating Killer Web Sites	Hayden	£41.50
7 Java in a Nutshell: Desktop Quick Reference	O'Reilly	£14.95
8 HTML: Definitive Guide	O'Reilly	£20.50
9 Microsoft Windows 95 Resource Kit	Microsoft Press	£46.99
10 Inside The Windows 95 Registry	O'Reilly	£24.95

List supplied by The PC BookShop, 11 & 21 Sicilian Avenue, London WC1A 2QH.

Tel: 0171 831 0022. Fax: 0171 831 0443



How Intranets Work

The latest in the Ziff-Davis "How It Works" series takes a timely look at intranets and turns out to be a fine introduction to the technology. As usual the graphic style leads you gently through the technology and procedures behind intranet installations, such as the fundamentals of TCP/IP, routers and DNS servers.

Such a book may raise a few guffaws among your IT department. Don't worry — you are likely to learn far more with this than any of the hardcore networking books your colleagues pretend to understand.

PJ Fisher

PCW Contacts

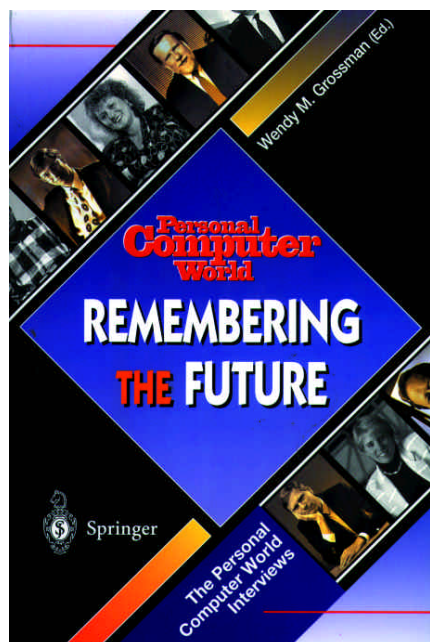
Remembering the Future: The Personal Computer World interviews
ISBN 3-540-76095-4
Price £14.95

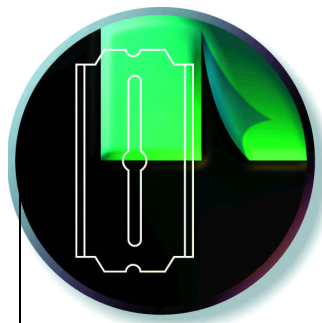
HAL's Legacy: 2001's Computer as Dream and Reality
Editor David G. Stork
Publisher MIT Press
ISBN 0-262-19378-7
Price £16.95
★★★★

Business and Law on the Internet
Author Oliver Hance
Publisher McGraw Hill
ISBN 2-930150-05-X
Price £29.29
★★★★

Webmaster in a Nutshell
ISBN 1-56592-229-8
Price £14.50

How Intranets Work
ISBN 1-56276-441-1
Price £26.95





Identity parade

No passports, passwords or PINs? Biometrics is a new technology which scans you to check you really are who you say you are. Toby Howard checks out the ultimate in ID.

It will be the ultimate in personal ID. No cards, no passwords — just you. You are scanned, and a computer checks if “you” really are you. The machine won’t be fooled by someone made up to look like you, or even by your identical twin. It’s coming.

Most of us have several passwords to remember, along with at least one PIN number for the cash dispenser, and perhaps security codes for our workplace, our home burglar alarm, mobile phone. Do we really need to fill our heads with this rubbish? No, say the proponents of “biometrics”, an emerging technology set to supersede PINs and text-based security systems. Biometric systems make measurements of a person’s physical characteristics and behaviour, which can subsequently be used for comparison against a database of known individuals. Using biometrics, computers will be able to identify us from the shape of our face or the distribution of the heat it emits, from fingerprints, voice, the patterns of blood vessels in the retina, the shape of our iris, DNA, handwriting, the length and shape of our fingers, and the patterns of veins in our hands. With all these techniques, the principle is the same: if there’s a match against a stored template previously scanned from you, then “you” are you; if there isn’t a match, you’re somebody else.

The widespread applications of biometric identification are clear: access control, immigration checking, law enforcement and so on. Some commercial systems are already available and in place. In the United States, the Connecticut Department of Social Services has introduced an identification system based

on finger images to crack down on welfare fraud, and devices which can recognise the geometry of hands are in use at San Francisco airport. But if there is a Holy Grail for biometrics researchers, it is to create a foolproof recognition system based on a computer just looking at you.

Like almost anything to do with the way our brains work, the mechanisms by which we recognise faces remain largely unknown. The problem has long fascinated psychologists, who have devised endless ingenious experiments to try and understand how our brains perform this monumental task of data processing. Studies of patients suffering from prosopagnosia, the neurological inability to recognise faces, and grim experiments on macaque monkeys, have suggested that there are specific collections of brain cells concerned with face recognition, but there is still no deep understanding of how normal brains recognise faces. It is this ignorance which makes trying to program a computer to



Here’s looking at you, kids: A biometric identity-checking system won’t be fooled by identical twins, let alone whole families of lookalikes like the Walton sextuplets. Commercial systems are up and running in the US

recognise a face so extraordinarily hard, as researchers have been finding for decades. Although most implementors of face recognition systems take quite different approaches, their techniques share a number of common steps: (1) capture the image, (2) strip off any background features and isolate the face, (3) attempt to identify the main facial features — eyes, nose, lips, and (4) normalise the facial features according to a standardised grid system. At this stage, the normalised face can be

matched against a face database.

The process is fraught with difficulty. One problem is that people change their hairstyles and facial hair, wear hats and glasses, stand at odd angles to the camera, and frown and smile. And when did you last look like your passport photograph?

Nevertheless, there are several face recognition systems already on the market. Most are PC-based such as TrueFace, ZN-Face, FaceVACS and NeuraWare, and all need fast Pentium support. Manufacturers of face recognition and other biometric identification systems generally make sweeping claims for their accuracy, but according to the US Government’s Biometric Consortium, field tests often reveal far lower reliability. For face recognition the reliability of the match will rarely exceed 90 percent, but for many applications an accuracy of less than 100 percent simply won’t be acceptable.

Research at the Sandia National Laboratories has shown that of the various biometric systems available or under development, hand recognition is the most reliable and voice recognition the least. There are sometimes unexpected drawbacks, too: it was recently reported in *New Scientist* that a researcher at the University of Adelaide has discovered that the fingerprints of koala bears are uncannily similar to those of humans. So a fingerprint recognition system would probably be a bad choice for an Australian wildlife park.

The use of biometric recognition techniques, when they become reliable and cheap enough, will fundamentally change our relationship with computers. If you walk up to a PC running a screensaver, you have to touch the keyboard or mouse to wake it up. You are in control. On the other hand, with the idea of a dozing machine that will only wake up if it likes the look of the person approaching it, the game changes. Now who is in control?

The widespread use of biometrics raises serious cultural and ethical questions. Do you want to be scanned and measured by a computer? To what extent are you still free if a computer can look at you and decide whether you are “you” or not? Some people are afraid that biometric technology will steal their souls. Nevertheless, Big Brother will soon be watching — and sensing — you.

For more information on face recognition and other biometric technologies, visit www.cs.rug.nl/~peterkr/FACE and www.vitro.bloomington.in.us:8080/~BC/. ■

Into the light

Light Intensity Modulated Direct OverWrite (LIMDOW) technology is set to do wonders for optical media. Tim Frost sees how.

There has been a traditional battle of the optical media between Magneto-Optical and Phase Change. While both use a laser to heat up the surface of the disc, with Phase Change the heat of the laser turns the write layer from a crystalline structure to an amorphous one which has lower reflectivity. MO uses instead a combination of laser and a hard-disk magnetic head. The MO disk’s magnetic write surface has the property of reflecting laser light at slightly different angles depending on which way it’s magnetised, and data can be stored on it as north and south magnetic spots, just like on a hard disk. While a hard disk can be magnetised at any temperature, the MO disk’s surface has to be raised several hundred degrees centigrade before it will let its magnetic orientation be changed. The drive’s laser heats up a spot on the disk which is then written to by the magnetic head. Where the laser/magnetic head hasn’t touched the disk, the spot represents a zero, and the spots where the disc has been heated up and magnetically written will be seen as data “ones”.

Both types of disks can be read by similar drives, with a low-power laser bouncing off the disc and the areas of light

and dark or those angled in different directions representing the data on the disc.

Historically MO has nearly all the advantages — a long line of backward-compatible disc formats from 600Mb upwards, support from a wide number of manufacturers and higher-capacity disks. But despite all this, PD has survived and done very well for itself. Why?

Well, there’s one major fly in the ointment for MO: before you can rewrite onto any part of an MO disk you have to erase the data first, to reset everything in the area to zero so there is a clean sheet to put the new data onto. So each time you write an MO, it takes literally twice as long to do, as the head does a first pass to erase and normalise the surface and only then can it go on to a second pass to write the new data. This may not be a dramatic problem if you are writing to a single disc for archiving, but MOs and PDs are used in big jukebox server arrays — maybe fifty drives writing and reading continuously — and a slow write speed is not exactly a plus.

But this is all set to change with the introduction of Light Intensity Modulated Direct OverWrite technology (LIMDOW to its friends) with new drives being delivered now by the likes of Plasmon and Fujitsu.

LIMDOW MO drives will become a serious option for AVV and multimedia applications



LIMDOW disks and drives work on the same basic principle as a standard MO drive: the write surface is heated up and takes on a magnetic force applied from outside. But instead of using a magnetic head in the drive to make the changes, the magnets are built into the disk itself.

The LIMDOW disk has two magnetic layers just behind the reflective writing surface. This write surface is even more clever than MO as it can take magnetism from one of those magnetic layers when it has been heated up to one temperature; but if it has been heated up further, it will take its polarity from the other magnetic layer. To write the data onto the disc, the MO drive's laser pulses between two powers.

At high power, the surface heats up more and takes its magnetic "charge" from the north pole magnetic layer. At the lower power, it heats up less and takes its magnetic charge from the south pole layer.

With LIMDOW, the MO write process is a single-stage affair, bringing write times back up to where they should be — if not competing head on with a hard disk, at least out by only around a factor of two.

Producing MO discs is a complicated art, which is why they cost ten times more than CD-R blanks. Making the LIMDOW disks is only a little more complex and they carry a premium of less than ten percent, which on an L60 disk is not a great deal.

Apart from making MO competitive on write times, LIMDOW leads the way towards higher-capacity MO disks. Because the magnetic surface is right next to the writing surface (rather than somewhere outside the disk itself) the magnetic writing can be done at a much higher resolution — in fact, the resolution of the laser spot doing the heating up. In the future, as the spot goes down in size, with shorter wavelength red-ish lasers and then the mythical blue laser, the capacity of the disc can jump up to four times the current 2.6Gb or more.

LIMDOW will appear in most MO drives this year, strengthening MO in its traditional market like CAD/CAM, document imaging and archiving, and moving it into new areas. With search speeds of 25ms and data transfer rates averaging out at 4Mb/sec, LIMDOW MO becomes a serious option for A/V and multimedia applications. The data rates are good enough for storing audio and streaming MPEG2 video, which brings MO back into the equation for video servers in areas such as near-video-on-demand. ■

Soft option

Motorola is offering OEMs a V.34 software modem that is downloadable from the internet. PJ Fisher logs on.

Just as the world of modem technology was starting to come to terms with 56Kbps transfer speeds, up pops Motorola with another breakthrough. It has revealed details of a new generation of modems that piggyback onto the power of Pentium processors using only software to control major functions.

The snappily-named SM34DFV V.34 software modem is the first of these. It's a V.34 data/fax/modem with full voice- and speaker-phone facilities. The difference is that the modem uses the PC's host Pentium processor for modem controller and datapump signal processor functions.

In effect, Motorola is using Host Signal Processing (HSP), a generic term for taking intensive hardware real-time signal processing away from add-in cards (such as modems) onto the ever-growing capacity of Pentium processors.

This modem was demonstrated at Comdex last November where Motorola hooked up networked games of Quake to demonstrate that the modem was just as fast as conventional units even when the processor had to contend with the demands of running graphic-intensive games as well. Another demonstration had users employing voice recognition software to surf the web.

Ultimately, Motorola believes that system software could incorporate all the functionality of communication devices, from error correction to compression/decompression and modulation.

For those worried about loading modem operation onto the PC processor, Motorola claims that the modems will be optimised for reduced processor loading. This means a software design that allows normal running of other PC packages such as word processors and spreadsheets while the modem is running in the background.

The modem is said to be compliant with Windows 95 (truly plug and play!) and the software includes a Windows control panel



One of the leading lights in modem manufacture, Motorola is the first to offer a software communications solution

applet said to offer easy access to modem status and configuration. The panel shows CPU usage in Low, Medium and High, a Properties button, and access to an online user's guide.

In time the modem will be upgradeable to the 56K modem standard and, being a software solution, it means a simple download from the internet. Motorola believes that software modems (and other comms hardware such as video-conferencing boxes) will appeal to companies wishing to save money on upgrading, especially as the internet becomes indispensable to modern business.

So while the modem is not going to be available direct to the public (it's for OEMs only) it could well turn up in the next replacement box that your IT manager decrees is suitable to your role in the company. Home users too may benefit.

The vice president of Motorola's ISG, Richard Leslie, said: "This is our first move to offer software communications solutions that ultimately could place many communications and multimedia functions — from videoconferencing to digital audio — onto the host processor."

The modem is available to OEMs now and more information is available from Motorola at www.mot.com/isg. ■

Hands On Contents

■ *Hands On* is the place where readers can contribute to *PCW* and, as always, we'll pay for anything we use. Macros, sections of code, and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard cash for longer, more involved pieces. Please include relevant screenshots in .GIF format.

All submissions should be emailed to the author of the appropriate section or snailmailed to Hands On, *Personal Computer World* Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.

We're constantly working to improve the contents of *Hands On*. If you have any suggestions, send them to the Editor at the address above, or email them to pcw@vnu.co.uk

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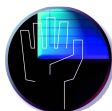
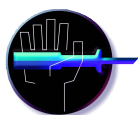
Tim Nott presents a Real-time Bovine Excrement Generator macro (yes, really), tips for tables in Word, and answers some quick FAQs.

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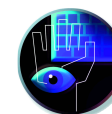
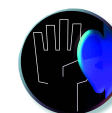
Don't ignore your serial port — it could help you maximise comms speed. Plus, the difference between baud rate and bps.

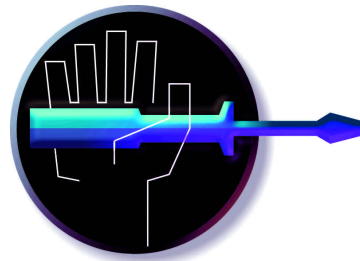
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A sporting chance

Visual Basic gives the mythical PCW sports club the database treatment in the second of our workshops, conducted by Tim Anderson. He also studies the life of a VB object.

Last month's workshop showed how to create a simple database application for the PCW sports club. It was a flat-file database, which means all the data was stored in a single table, like a card-index. At the sports club, though, it is important to know which sports a member has signed up for. A member can sign up for any number of sports, and each sport is played by any number of members. This is a classic many-to-many relationship, but it is not always obvious how best to store this kind of information.

One strategy would be to add several fields to the table of members, for Sport1, Sport2, Sport3, etc. Another possibility is a notes field with the sports entered line by line. Both these ideas are fatally flawed. Although they seem easy, they are actually inefficient and inflexible. For example, what happens when you want a list of all the footballers? You would end up with a horrible keyword search and probably get inaccurate results.

The correct approach is to analyse the data into three tables. The first one is the table of members. Next there is a table of sports, which for the moment has just two fields, Sport and ID. The third table records which member belongs to which sport. SportLink again has two fields, MemberID and SportID. If you view the table on its own it will look like a meaningless string of numbers, but in combination with the other tables it makes sense. Later you might want to add other fields to SportLink, perhaps a Role field which contains information like "Goalkeeper" or "Captain". It is important to grasp this principle, which is a great way to store all kinds of data.

The main form needs adapting to display

this new information. Since a member may sign up for any number of sports, these are best displayed in a listbox control. To keep the form from getting cluttered, a good tip is to use a tab control as well. Visual Basic 4.0 comes with two: a TabStrip which is for

Windows 95 only, and the SStab which comes as both a 16-bit and 32-bit OXC. In this example SStab is used. The tabs work at design time, making it easy to lay out the form. When a tab is selected, controls placed on it belong to that tab. Controls placed on

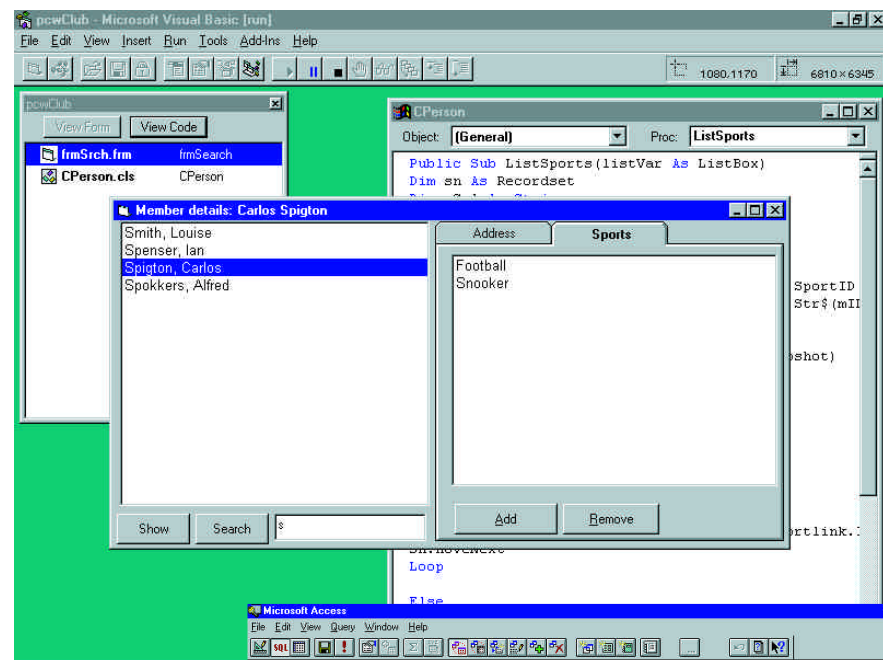
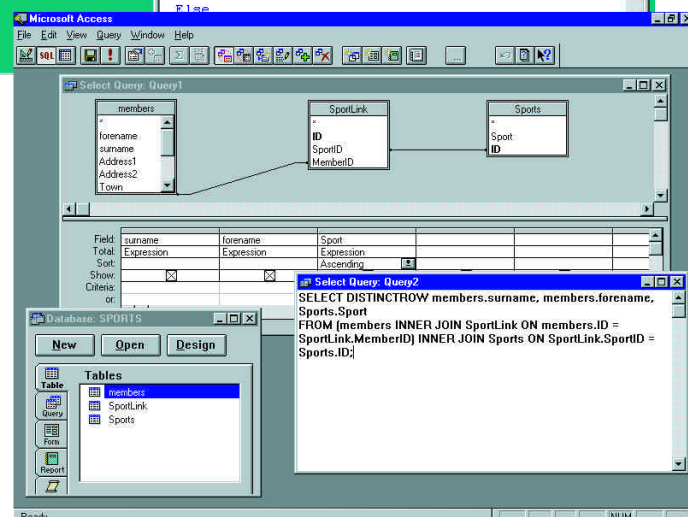


Fig 1 The enhanced Sports Club application stores data in a many-to-many relationship

Fig 3 A good ruse when you need to work out SQL for Visual Basic is to let the Access query builder generate it for you



the form itself will show through all the tabs. Fig 1 shows buttons for adding and removing members from particular sports, but these are not yet enabled.

The next step is to write code to display the list of sports for each member. One idea is to add a ListSports method to the CPerson class. The ListSports method takes a listbox control as a parameter. It searches the database to get the list of

sports and adds them to the listbox. Doing it this way means that if a list of sports is needed at some other point in the application, it will not be necessary to rewrite the code. All you need do is to supply the ListSports method with an available listbox. The code for CPerson.ListSports is in Fig 2.

Much of this code is similar to that used last month for searching the members

table. The main difference is that the SQL query for extracting data from two tables is more complex. If you followed PCW's recent SQL workshop, you will have no problem. If not, notice that the SQL string includes several sections:

1. Which fields to extract — SELECT * for all fields.
2. How the two tables are linked — the first part of the WHERE clause.

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Fig 2 The code for CPerson.ListSports

```
Public Sub ListSports(listVar As ListBox)
Dim sn As Recordset
Dim sSql As String

listVar.Clear

' build up the SQL command
sSql = "SELECT * FROM Sports, Sportlink "
sSql = sSql & " WHERE Sports.ID = Sportlink.SportID "
sSql = sSql & " AND Sportlink.MemberID = " & Str$(mID)
sSql = sSql & " ORDER BY Sports.Sport"

Set sn = myDB.OpenRecordset(sSql, dbOpenSnapshot)

' now fill the list box

If Not (sn.EOF And sn.EOF) Then
' there are records
sn.MoveFirst

Do While Not sn.EOF
listVar.AddItem (sn!SPORT)
listVar.ItemData(listVar.NewIndex) = sn! [SPORTLINK.ID]
' the square brackets and table name are needed because
' there are two different ID fields
\ in the result set
sn.MoveNext
Loop

Else
listVar.AddItem "None"

End If End Sub
```


The life of a VB object

Introduced in Visual Basic 4.0, class modules are a way to create user-defined objects. For example, the Sports Club application has a CPerson class with properties and methods. These constitute the interface which a person object presents to the application. Whenever your other code has to interact with a person object, it does so through this interface. If the interface stays the same, you can change or improve its implementation (the code which drives those properties and methods) with no danger of breaking the application. If you add to the interface, those new features are available wherever a Person object is referenced.

The first thing to understand is the lifetime of an object. Unlike other variables, you can't simply DIM a CPerson object and then refer to its properties. Objects must be instantiated. For example, this gives an error:

```
Dim Myperson as CPerson
Myperson.surName = "Baxter"
```

Error — object variable not set. Instead you need code like this:

```
Dim Myperson as Cperson
set Myperson = New CPerson
Myperson.surName = "Baxter"
```

Or if you start with:

```
Dim Myperson as New Cperson
```

VB will instantiate the object when first referenced.

The question of instantiation is important because it does not just allow you to start using the object. It fires an

Judicious use of Debug.Print can help track the lifetime of VB objects

event, Initialize. All class modules have this event predefined. It is extremely valuable, since you can do things like setting default values for properties, or opening a link to a database, or instantiating other subsidiary objects as required. Sadly, Initialize cannot take parameters, making it less useful than it should be. There is another, similar event called Terminate, which occurs when the object is destroyed.

But when is the object destroyed? It is destroyed when there is no longer any active reference to it in your code. This feature is designed to make it easy to manage objects, but can get confusing. If you have an object variable declared in a procedure, it goes out of scope and the object is destroyed when the procedure finishes. But if you have assigned the object to another variable which is still in scope, the object is not

destroyed: the listing (left) illustrates the point. So far, not too difficult. It's harder when your objects are more ambitious. Perhaps you want a CPerson to have a Display method which creates and

shows a form. VB forms are just another kind of class, and the obvious approach would be like this:

```
public sub Display()
Dim myform As New DisplayForm
' ... code to fill the fields
myform.Show
```

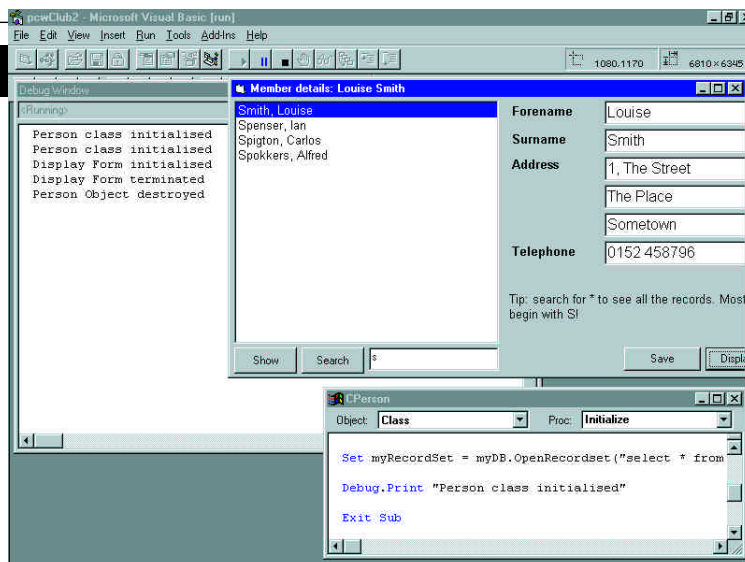
But to encapsulate things you will want a Hide method which disposes of the form. That means keeping a reference to the form in the CPerson class, so the DisplayForm variable needs to be scoped to the class. It is likely the form will need to interact with its corresponding CPerson object, so you give the form a Person property. The references start to proliferate, and neither the DisplayForm nor the Person object will be destroyed until the last one goes out of scope or is set to Nothing. If your Hide method was like this:

```
Unload myForm
```

that would not destroy the form object. In turn, the form object would prevent the Person object from being destroyed, because it still has an active reference to it. You have to add the line:

```
Set myform = Nothing
```

to clean it up properly. The conclusion is that you need to watch the lifetime of VB objects closely or they could stick around for longer than they are wanted.



Destroy all objects!

```
Dim Myperson As New CPerson
Myperson.surName = "Baxter"
Set FormPerson = Myperson
' assumes FormPerson is scoped to the form
' both now refer to the same object
Set Myperson = Nothing ' Object is NOT destroyed
Set FormPerson = Nothing ' Object is destroyed
```

- An additional restriction — the second part of the WHERE clause after AND. This ensures that only data for the current member is extracted.
- An ORDER BY clause to sort the results. Working out SQL acceptable to JET, the VB database engine, can be tricky. A good

ploy is to build a query in Access, then cut-and-paste the generated SQL code (Fig 3). Note that often, more than one SQL expression will product the same result, sometimes with performance differences. ■ All the code for this month's VB workshop is on this month's cover CD.

■ Next month: Visual Basic, inheritance and delegation.

PCW Contact

Tim Anderson welcomes your comments and queries. Write to the usual PCW address, or email freer@cix.co.uk



Do it to music

Go beyond Control Panel/Sounds and add your favourite .WAVs on a per-program basis. Tim Nott shows you how to do it without third-party help. Plus, a surprise trip to the future.

Back in the days of Windows 3.0, I had a shareware toy called "Whoop-it-up". It went beyond the capabilities of the Control Panel/Sounds feature in that it enabled you to assign sounds not only to overall system events (Open, Close, Maximise, etc) but also on a per-program basis. It offered hours of entertainment and displacement activity. You could have your word processor opening with a few bars of Buddy Holly's "Words of Love", or watch CorelDraw crash to a clip of Murray Walker saying "Oh my goodness, he's spun off... again!" Anyway, the good news is that you can do it all in Windows 95 without any third-party help. It does involve a little registry editing, so back up SYSTEM and USER.DAT first.

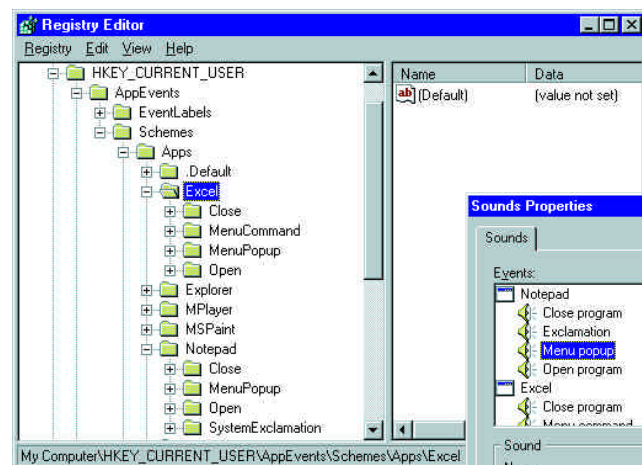
Fire up Regedit, and boldly go to HKEY_CURRENT_USER\AppEvents\Schemes\Apps.

Under this, you'll see a key for ".Default" but there may be others. With "Apps" selected, right-click and pick "New Key". Type in the name of the program you want to add; that's the filename of the executable, without extension or path (e.g. "Notepad" or "Excel"). Highlight it and create new "Event" keys below it (e.g. "Open"). A list of the possible keys, and what they do, is in Fig 1.

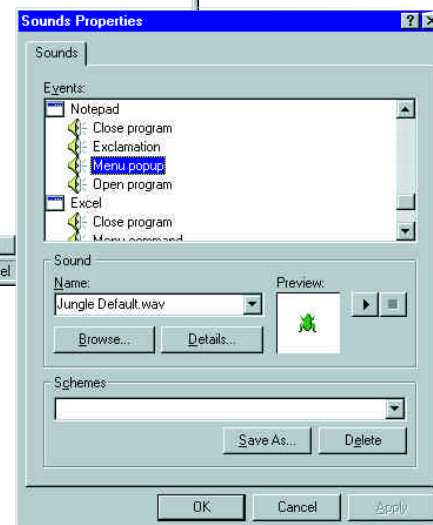
Continue adding program and event keys until you're bored but don't assign any values to them. Close Regedit. Open Control Panel/Sounds. All your new applications and events will be sitting there, waiting for sounds to be assigned. Browse away to your favourite .WAV files.

What's app, Doc?

Q. Julian Toler has a mysterious file named "-oleapp.doc" which appears in C:\TEMP. He says it "is strange because I have 'SET



Add programs and events via Regedit (left) then find them in Control Panel to assign sounds (below)



TEMP=C:\WIN95\TEMP' in my AUTOEXEC.BAT. It appears immediately after boot-up, with a size of 1,536 bytes, and is not write-protected. I usually delete it manually if I spot it, and have a line in my AUTOEXEC.BAT which does the same, but like a bad penny it keeps on turning up."

A. Relax, Julian, for this is mostly harmless. The official Microsoft explanation is that if you have Office Fast Start loading in your StartUp folder, and a folder named TEMP in the root of the hard disk, "Fast Start creates the file in order to test OLE calls. Fast Start does not create the file if the temporary folder is set to a path other than the one at the root level." Which latter doesn't quite ring true with your experience, or mine: even with the TEMP environmental variable set elsewhere, it still gets created. Incidentally, you don't need an explicit SET TEMP = line in AUTOEXEC.BAT. It automatically gets set to the TEMP folder in the Windows folder. If you remove the entry and type "SET" from a DOS box, you'll see what I mean.

Q. "How can I run a screensaver on demand?" asks David Garrett. "I have seen

an undocumented tip referring to 'live' corners of the screen, but I've never managed to get it to work."

A. Me neither. It seems you need the Plus! pack installed and System Agent running. A method which will work, however, is to drag a shortcut from the screensaver (*.SCR) file to the Desktop (or wherever). Double-click to start saving. Right-click to fiddle with the settings. You'll have to go via Control Panel to enable or change a password but once you've set this up it works for all .SCR shortcuts. Without the password, no-one can get back into Windows except by switching off the machine.

Once they've done this, and probably lost your unsaved data, left your machine full of TMP files and generally messed things up, then it's simple enough to disable

Fig 1 Sound event keys

AppGPFault	Application GPF error
Close	Close program
Maximise	Maximise program
MenuCommand	Select from a menu
MenuPopup	Menu drop
Minimise	Minimise program
Open	Start program
RestoreDown	Restore from maximised
RestoreUp	Restore from minimised
SystemAsterisk	Asterisk message
SystemExclamation	Exclamation mark message
SystemHand	Stop sign message
SystemQuestion	Question mark message

password protection on screensavers. Just go into Control Panel/Display/Screensaver and untick the box. Changing the password is simple, too, as you don't need to know the old one. (There is a known bug which causes passwords with more than 19 characters to hang, but that shouldn't be a problem for any but the obsessive.)

Q. Clive Tomkin was wondering where all his disk space had gone, until he "found a huge file in C:\Exchange named Mailbox.pst".

A. This, as he correctly guessed, is the Exchange database containing all incoming and outgoing mail messages, including faxes which, as they are essentially bitmaps, can be large. So go through your Inbox and Sent Items, delete everything you don't want to keep, and you'll find that Mailbox.pst has remained the same. This is because Exchange doesn't delete or send the items to the Recycle Bin; it simply flags them as "deleted items" and shows them in the pseudo-folder of that name.

Clive was wise to this, of course, so promptly deleted the entire contents of "Deleted Items" and they disappeared. A quick check on Mailbox.pst showed that the file size was... exactly the same. It seems as if Exchange just doesn't want to let those old messages and faxes go. The answer is to go to Tools/Services in Exchange (or right-click on the Inbox icon, Properties/Services) and highlight "Personal Folders". Click the "Properties" button and in the ensuing dialogue, click "Compact now". Intuitive, I don't think.

Top tips of the month

An encouraging response this month to my request for readers' suggestions to replace Windows' "Tips of the day": a

bumper email from Neil Jarvis included "Avoid tumbling off the cliff of triteness into the black abyss of over-used metaphors" and "Who is General Failure? And why is he reading my drive C:?" Adrian Sutton's selection included this fine quote from Douglas Adams; "The secret of flying is to throw yourself at the ground, and miss." Do keep them coming.

A hex on it — and other tips

Some applications store information in the registry in hexadecimal format. Usually this is used to encode things like user preferences or toolbar settings, but some applications use it to store things normally expressed in plain text (e.g. file locations). I'm too ignorant to fathom why this should be desirable, let alone necessary, but suffice it to say, according to Regedit, WordPerfect stores its templates at 66 3a 5c 43 6f 72 65... (Fig 2). Not very helpful. But if you double-click on the entry, the dialogue box provides a translation; in this case f:\Corel\Office7\Templat

Note that you can edit in either format, by clicking in the appropriate section.

To display the size of a folder and all nested folders, right-click the folder, select "Properties" and (if there's a lot below) wait. It isn't compulsory to have all shortcuts branching off the "Programs" item in the Start menu. Right-click the start button and select "Open". Right-click in the "Start Menu" and select "New". Create a new shortcut and this will appear at the top level of the start menu: create a new folder, and any shortcuts created within will branch straight off the top level.

The tip (Hands On, October) for getting a permanent record of your hardware settings from the "Print" button of Control Panel/System/Device Manager has been enhanced by Howard Anderson, who complains that there's no way to get all this

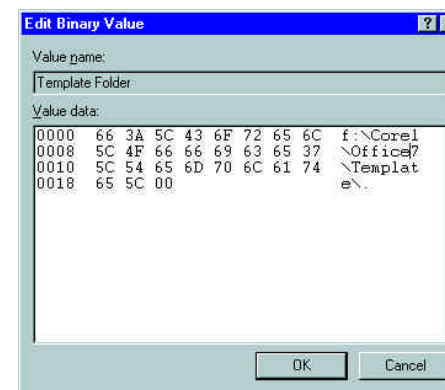


Fig 2 What the hex? Regedit provides a translation

info on-screen. His workaround is to "Print to HTML", using the driver that comes with Power Toys, to view the file in his web browser. Do not forget the old standby of installing the "Generic/Text Only" printer driver and printing to file — this produces plain text.

■ Further developments in Graham Slope's query about how to get Startup shortcuts to load in the desired order (Hands On, January). Malcolm Burch reckons they execute in the order they appear in the DOS directory and the secret is to move them all to another folder, then move them back in the desired order. Doing a DIR from an MS-DOS prompt should list them in the order they will execute. I've tried it, and it seems to work, but I've noticed that slow-loading apps tend to get "leap-frogged" by faster-loading ones. And this also applies to my solution of using a batch file. So hats off again to Alex Nichol, who pointed out that you can use the "/W" switch with the DOS "START" command. This waits until the called program has loaded (or finished doing whatever it does) before returning control to the batch file.

■ This tip may also solve Rab Steven's query on CIX. He wanted to "run a couple of utilities, just before the computer is shut down (file tidies and the like). It's easy to get the beast to do it at start-up, but how do I get it to do something automatically at shutdown?" Bearing in mind January's tip about exiting Windows without the confirmation dialogue, the following batch file should do the trick, where THIS and THAT are the utilities concerned:

```
START /W THIS.EXE <parameters>
START /W THAT.EXE <parameters>
C:\WINDOWS\RUNDLL32.EXE
user.exe, Exi tWindows
```

■ Here's another tip from Alex Nichol (which takes him into the realms of CD/book token winners). Sending files to a printer in Win95 usually involves launching an associated application, if only to add word wrap. But there is sometimes a need to send a file directly to the printer, say as a print image or PostScript code. Launching the application is time consuming and may not even be available. You can do it with the COPY command in a DOS box, but this tip automates the business. With NotePad make a small file containing only

```
COPY %1 LPT1:
```

and save it in the Windows folder as PRINTIT.BAT. Now right-drag this to the Desktop, and choose "Make Shortcut".

Back to the future — strange days indeed

There I was, having just finished a feature minutes ahead of my deadline, when I opened the folder, selected the .DOC file, the .XLS feature table and sundry .GIF screenshots. I right-clicked and selected "Add to Zip": WinZip duly fired up, barfed, and fell over. I eventually managed to Zip the files using raw PKZip from a DOS window and went to start Ameol (the off-line reader for CIX) so that I could send the zipped files to PCW. Ameol duly fired up, barfed, and fell over.

In the end, I managed to transmit the file using Hyperterminal, two tin cans and a piece of wet string, but something was obviously VERY WRONG. Having tried a few obvious things such as rebooting, virus checking, running ScanDisk and going out for a few beers, the problem remained. Just by chance I happened to waft the pointer over the Taskbar clock — and up popped the date. The day and the month were as expected but somehow I was in year 2096.

Now, I've dozed off at my desk before, but this was ridiculous. Strangely enough,

Name it, say, "Copy to Printer". Right-click Properties/Program and add "%1" (including the double quotes) to Cmd Line. It should read C:\Windows\PRINTIT.BAT "%1". Set it to run minimised and tick "Close on Exit". You can also change the icon to something appropriate, like the printer icon in Shell32.dll. Dropping any file onto this icon will copy it "raw" to the printer. Note, though, that text files may or may not have hard returns in them; if they don't, they will still need to go via Notepad or WordPad to add word wrap.

Error messages

Thank you, Colin Green, for pointing out that the new Microsoft Mouse Wheel (Hands On, January) also works in Help. Thanks, also, to Robert Bruce for pointing out that "The registry Hearts cheat key lurks in .../Windows/Applets/Hearts and not in .../Windows/Hearts as stated." Alex Nichol pointed out that my problem with not getting "MORE" to work (Hands On, December) is because I didn't have the DOS keyboard driver loaded. Honestly, I did know that once... You need both

```
COUNTRY 044, 850, C:\WIN95\
COMMAND\COUNTRY.SYS
```

in CONFIG.SYS, and

2096 looked and felt very much like 1996. So, taking into account this weight of empirical evidence, I reset the computer's date and all my problems disappeared. Well, almost, because I still had loads of files with 2096 creation and modification dates. Loading them into the relevant application and resaving them cured this for some, but not all. And there were rather a lot of them.

Somewhere, a little bell rang, and I restarted ScanDisk, blew the cobwebs off the "Advanced" button, and there it was: a "Check for invalid dates and times" option waiting to be ticked. This found even more invalid dates in files and folders, including places like the "Fonts" folder that "Find File..." doesn't. And it seems to have mended them.

As to what caused this great leap forward remains a mystery. Fellow sufferers blame everything from a particular Compaq BIOS (which I don't have) to rogue software, of which I have lots. Anyway, should strange things start to happen on your PC, *check the date*.

KEYB UK

in AUTOEXEC.BAT. You can put this directly into the "batch file" pane of the DOS Prompt shortcut.

Relax...

Let all troublesome thoughts, such as getting any work done, float away as you listen to Syntrillium's Wind Chimes (WC1SETUP.EXE on this month's cover-mounted CD-ROM, or available from www.syntrillium.com). This uses the MIDI capabilities of your sound card to generate more or less random tunes. You can choose the instrument and any one of 64 preset scales. You can control the number of chimes, the distance between them and even the variation in the wind speed. And if this all sounds far too complicated, there are over 40 predefined schemes. Two things you must try are: running your fingers (well, your mouse pointer) through the chimes at the top right of the control dialogue, and running two or more instances of Wind Chimes. It's quite the most delightful thing I've had on my hard disk for a long time, and so relaxing that... I really don't... think... I can write another... Zzzzzzz.

PCW Contact

Email **Tim Nott** at Win95@pcw.vnu.co.uk



Double trouble

Windows 3.x programs running under Win95 is not a happy marriage, but don't despair — Panicos Georghiades and Gabriel Jacobs explain how you can have the best of both worlds.

The good thing about new versions of software is that they are usually better than their older counterparts. This was undoubtedly the case with Windows over DOS, as it is with Windows 95 over Windows 3.x. But we are talking here about general use rather than specific applications which, in some cases, do run better on an older operating system.

The bad points about upgrading to new versions (apart from the cost) are that newer software is more likely to have bugs, and your machine and peripherals may also need upgrading. There's also the fact that not everyone is upgrading overnight; it's a gradual process sometimes taking years to complete, by which time an even newer version is on the way.

It would have been great if, say, on the 24th August 1995, every hardware and software manufacturer on earth had Windows 95 versions and drivers available. We could all have upgraded immediately, and painlessly. This didn't happen, of course, and even a year and a half later, there's hardware out there which doesn't have Windows 95 drivers, and software which will never be upgraded to Windows 95.

Microsoft may boast that Windows 95 has sold more copies than Michael Jackson's "Thriller", yet the reality is that the majority of Windows users have stuck with 3.x (usually 3.1). Many large organisations have been holding back because they know that the cost, in time, of solving incompatibility problems from new software is often much higher than that of buying the new software in the first place.

So, if you're not fascinated by solving problems, we recommend that you run Windows 3.x programs under Windows 3.x,

and dedicated Windows 95 native 32-bit programs under Win95.

We're not saying that Windows 3.x programs don't run under 95, but problems arise with non-Windows 95 drivers for hardware, old Win95 drivers, and some program installation procedures. Even if a Windows 3.x program doesn't depend on drivers, its installation procedure, designed for 3.x, may cause problems under Windows 95. It may replace files with older versions, or it may install things like Video for Windows and other MCI Windows 3.1 code not needed in Win95. It may mess up your Win95 installation, to a point where your machine simply will not start.

In general, play safe: you're far better off running programs on the operating systems for which they were designed. On the other hand, Windows 95, like Mount Everest, is there. So the solution is to have the best of both worlds. If your machine runs 3.x and is not up to Windows 95, don't upgrade it. Keep it as a Windows 3.x and DOS machine to run your old software, and put the money you save towards a new Windows 95 machine.

If your machine is up to running Windows 95 and you have a large hard disk (1Gb or preferably 2Gb as hard disks are very cheap nowadays), it is possible to keep your old DOS/Windows 3.x installation as well as a new Win95 installation, on the same machine. This is fairly easy to do, and you can have both working in harmony (but not simultaneously) provided you watch out for certain things.

Here's what you have to do, although you can only do it with versions of MSDOS 5 or later (see Fig 1 for the technical reasons why):

■ When you install Windows 95 and you are asked in which directory to install it, choose a different directory name from the one that Windows 3.x is using.

If you are starting from scratch (which is not a bad idea) you can use names like Win31 and Win95. You will then be warned that you will have to re-install your applications — you will have to do that with your new Windows 95 programs anyway.

■ Go ahead with the Windows 95 installation as normal. Windows 95 will copy some of your MSDOS files (scandisk,

Fig 1 Boot room

Why can't you have a double boot (Windows 3.x and Windows 95) with DOS versions earlier than 5.0?

The answer is that Windows 3.x sits on top of DOS, and in the earlier versions of MSDOS, the first three sectors of the `io.sys` file has to be placed in the first three sectors of the data area of the hard disk. Following version 5.0, this constraint was removed from DOS.

When you install Windows 95 on a PC running DOS 5.0 or later, the setup routine actually keeps your previous `io.sys`, `msdos.sys`, `command.com`, `autoexec.bat` and `config.sys` files after renaming them with a `.DOS` extension (`io.dos`, `msdos.dos`, and so on).

If you install Windows 95 in a new folder, the line "BootMulti=1" is automatically added to `msdos.sys`, after which you can have a double-boot configuration. But if you delete `io.dos`, `msdos.dos` or `command.dos`, or if they get damaged in some way, or even if you simply move them to any other directory except the root directory of the boot drive, you can't boot under DOS, and therefore you can't run Windows 3.x.

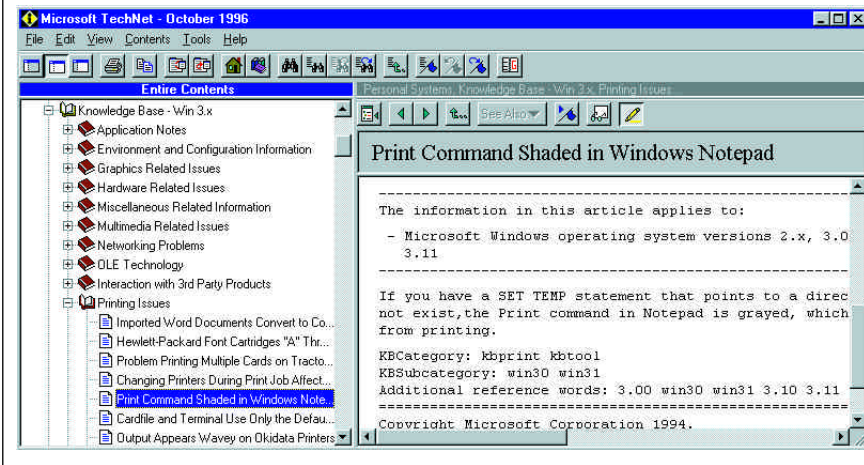
Microsoft Technet: our productivity product of the month

There are many books, CD-ROMs, videotapes and all kinds of courses on Windows 3.x and DOS. However, the richest mine of information is to be found on Technet (Technical Information Network), a subscription CD-ROM from Microsoft. This monthly set of CD-ROMs contains specifications, updated drivers, press releases, lists of problems and their solutions, as well as hints and tips from the developers and technical support people at Microsoft on

not only Microsoft products but some third-party products, too. There are literally thousands of articles through which you can browse by using either an Explorer or File Manager tree-type structure, or the built-in search facility.

If you are working in a support department, or are simply interested to find out about how to get the best from your system, this is the tops.

■ See "PCW Contacts" box for details.



defrag, etc) into its own directories and replace them with batch files (Fig 2, below). It will also rename some of your DOS system files (see Fig 1) and will leave your Windows 3.x installation alone.

■ After Windows 95 has been installed, press the F8 key during boot-up (very shortly before the message "Starting Windows 95"). This will give you a menu with a number of options for starting up. One of them will be "Start your Previous Operating System".

If you select this, your machine will start as before under your DOS/Windows 3.x operating system. In other words, you should be able to run DOS and Windows 3.x as if Windows 95 were not there. The Windows 95 directory and programs will be

visible on your hard disk, but file and directory names will be shown in the DOS eight-characters-plus-three-characters format (using the ~ character) instead of the long filenames.

For example, the Windows 95 directory Program Files will look like this (see also, Fig 3):

Progra-1
 ■ After the message "Now loading your previous version of MS-DOS, please wait", you may get one of the following error messages:
 Your previous MS-DOS version is not supported. MS-DOS startup failed.
 or, you could get
 Your previous MS-DOS files were not found. MS-DOS startup failed.

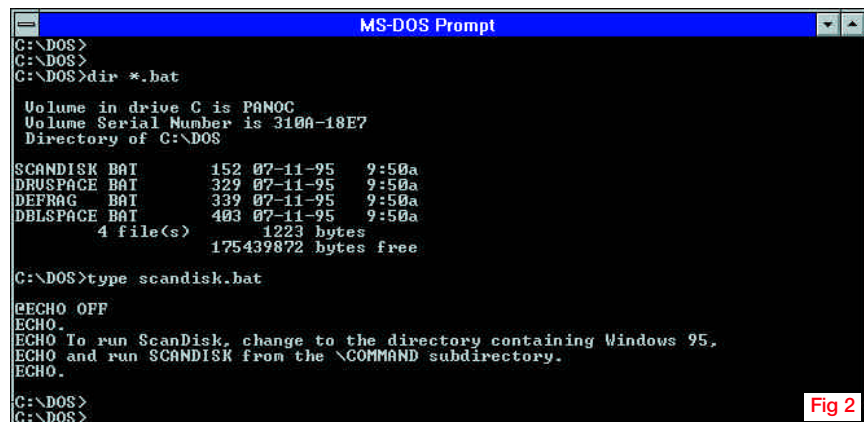


Fig 2

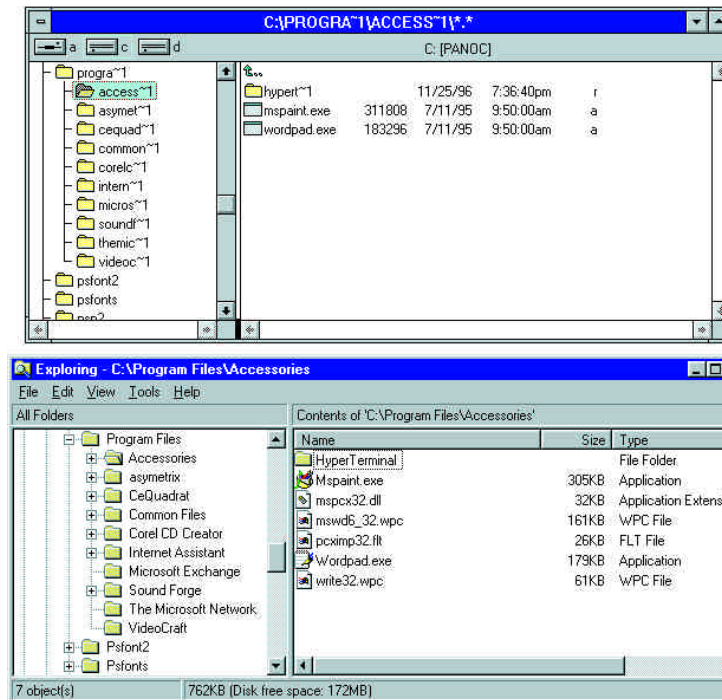


Fig 3 If you run Windows 3.1 and Windows 95 on the same machine, this is how the long filenames will look. This is normal

If you do receive one of these messages, you need to check whether the line `BootMul ti=1`

is present in the `msdos.sys` file in the root directory of your boot drive.

■ If it isn't there, you will have to edit the file and add that line. But take note that even though `msdos.sys` is a text file (and can thus be edited in Notepad) it is also a read-only, hidden system file so you'll need to change its attributes to modify it. You can

do this in Windows 3.x File Manager, or Windows 95 Explorer, or by using the `ATTRIB` command at the DOS prompt.

Things to watch out for

This multi-boot option requires you to restart your machine (either a three-fingered warm reboot with `Ctrl+Alt+Del`, or Reset will do) as you can't switch between one operating system and another just like that. And, by the way, make sure Windows 95

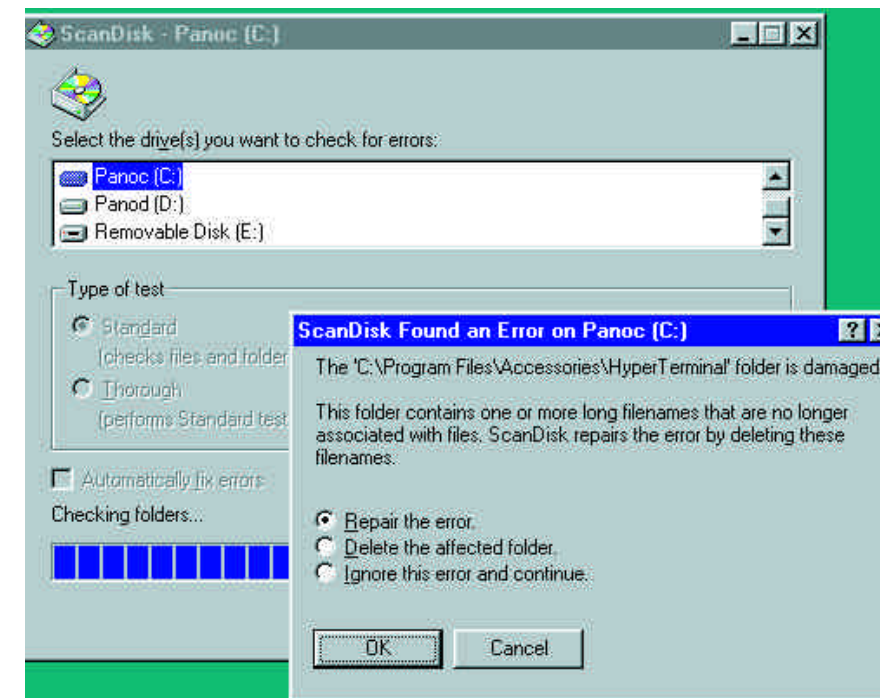


Fig 4 If you delete files with long names in Windows 3.1 or DOS, you may well encounter problems when running Windows 95

always shuts down properly first. Most PC manufacturers do not install Windows 95 over MSDOS, so if you have bought a machine with this standard type of Windows 95 installation, DOS system files will not be on it and you will not be able to have the dual boot unless you re-install everything yourself.

On top of all that, even though you can share data files and even run some programs under both operating systems, there are a few things of which you should be careful.

1. Configuration settings: Programs that keep their configuration (.INI) files in the Windows directory, rather than their own, may create two configurations and may run differently under the two operating systems. Don't expect the same settings to be available to you.

2. Long filenames: Use only the eight-plus-three format for any data files you intend to use under DOS and Windows 3.x. If you re-save or re-name a file (in Win95) created with a long filename, under Windows 3.x or DOS the name will be truncated and your long filename will no longer be available in your next Windows 95 session.

3. Disk manipulations (the importance of which cannot be over-emphasised): You should carry out all disk manipulations — defragmentation and scandisk operations, and as many file deletions and clearance sessions as possible — under Windows 95 instead of 3.x (Fig 4). At the very least, do not delete files with long filenames in a DOS or Windows 3.x session.

4. Last but truly not least: Do not use DOS and 3.1 disk tools (such as old versions of Norton and other, similar, programs) if you have Windows 95 in your machine. You may damage the Windows 95 installation.

■ Panicos Georghiades and Gabriel Jacobs have now taken up the mantle of Hands On Windows 3.1 from Tim Nott. In addition to writing his Windows 95 column as usual, Tim can also be found presenting Hands On Word Processing.

PCW Contacts
 If you have any queries or Win3.1-related topics to discuss, contact **Panicos Georghiades** and **Gabriel Jacobs** at Win3@pcw.vnu.co.uk.
 Microsoft 0345 002000, web address www.microsoft.com/TechNet/overview.HTM



Ways and means

Dale Strickland-Clark delves into the workstation and server versions of the latest Resource Kit for NT. Plus, where have all the drivers gone? There is a distinct lack of support for NT4.

It is certainly a welcome break to work in a DOS-free environment and be relieved of the resource limitations of Windows 3.1. The distinction between high and low memory is a thing of the past and I am happily unconcerned with where a program happens to be located in the memory.

In one respect, however, I find myself looking back longingly at the good old days of one, dominant, PC operating system, and that is device drivers: at least you knew that whatever bit of hardware you bought, it would come equipped with a device driver for DOS. (Whether or not you could get it to work was another matter.)

Hardware manufacturers' lacklustre support for NT4 is becoming a serious irritation. I have just returned a Sony CD writer because there was no NT4 driver (nor any prospect of one for months) as well as a cheap sound card which claimed to be SoundBlaster compatible when it was not. I have also defied Hewlett-Packard's tardy attitude by getting its ScanJet 4P to work on NT4, even though there is still (at the time of writing) no official support.

Having returned the Sony CD writer, and to avoid any more nonsense, I decided to get the replacement from a specialist supplier, CD Revolution, which I hoped would have some expertise in the subject. I was relieved to discover that this is a company which knows its field, knew what I needed, and was sharp enough with its service to have the new device delivered to me by the following day.

The Philips CDD 2600 is now installed and working a treat. The sound card is being replaced by a pukka SoundBlaster and is accompanied by my renewed resolve to never again buy cheap kit.

Hewlett-Packard (HP) is a mystery. My guess is that it is the most successful printer manufacturer of recent years and probably sells more scanners than any other company, yet it has relied on Microsoft to write the NT4 drivers for its printers and is still palming-off ScanJet customers with useless NT 3.51 drivers.

A partial solution to scanning on NT4 is available from HP's web site in the shape of an updated DeskScan package. But DeskScan won't work without a decent ASPI driver (a standard SCSI interface for use by application programs), which HP does not provide. You are expected to raid Adaptec's internet site for that — except HP will not tell you that is what you need do. HP simply points you, unofficially, to a web page written by Guy Melendez, a man who has figured out his own solution and documented it for the rest of us (see www.windows-nt.com/tipsandinfo/sjonnt.htm if you need similar help).

However, Adaptec writes ASPI drivers as a service to its customers and it would like you to be using one of its cards before installing drivers. The SCSI card which HP includes with its scanner is made by NCR, not Adaptec.

HP tells me that it is working to resolve these issues and it is touching to observe that the recent changes to DeskScan have been made to get it to work better (or even work at all) on NT. But HP's efforts show a distinct lack of urgency.

Peripheral manufacturers know that if your need for their products is pressing enough, you will run Windows 95 instead of NT just to get the driver support. This is all the more true in a corporate environment where there is probably a spare PC knocking about, which you can push into

service as a dedicated scanner, CD writer or whatever system.

Even if you are not running NT at present, make sure the hardware you buy has full NT support so that your future OS options are not restricted. Furthermore, you should pester manufacturers of your existing hardware for NT drivers. Some companies are far too keen to let obsolete models slip out of their minds and off the end of their support schedules in the hope that you will just upgrade the hardware.

NT4 Resource Kit

The Resource Kit, an invaluable set of additional tools and reference material, accompanies each major release of NT. This time, for NT4, the kit is split into two: Workstation and Server versions, each accompanied by a CD-ROM. The server kit comes as three books presented in a box but the workstation edition, while not noticeably smaller, arrives as a single volume. Presumably, the server edition needs a touch of class.

These kits are worth it for the CDs alone (but do not buy both resource kits just for the CDs; the Workstation CD is only a subset of the server's). There are a good few hours of enjoyable rummaging and discovery to be had, and while some of what you will find has appeared before, there is a lot that is new.

The two types of utility attracted my immediate attention. The first type allows the remote control of another computer on the network, and there are now at least three different ways of achieving that. The second utility provides you with virtual desktops — and this is something I have had to do without since I abandoned the quite wonderful PC Tools Desktop on

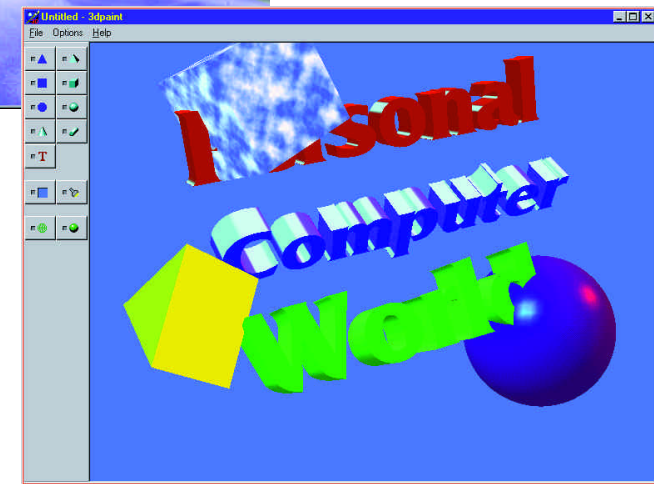


Left Installing the Workstation Resource Kit software: the dimmed menu items indicate the bits that only come with the server edition

Windows 3.11 in favour of NT, quite some time ago.

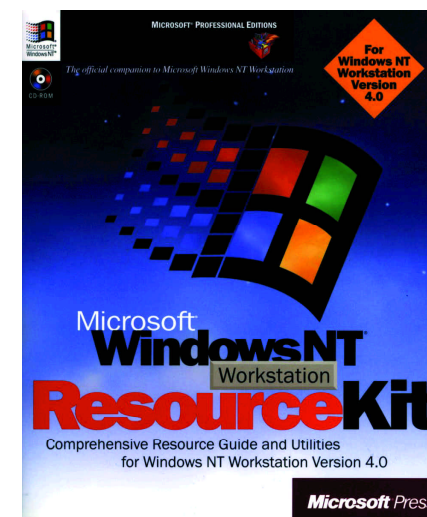
Remote control of other PCs on the network, in particular the servers, is essential if you want to avoid traipsing around the building whenever a bit of administration is required. One solution is the Telnet service. Using any Telnet client, simply connect to the server on which the service is running and respond to the traditional TTY-style logon sequence. You are then in a fairly standard console session, although lacking the niceties such as command recall.

Although this approach limits you to console commands, you do have the advantage of connecting from anywhere in the world (given a suitable internet connection, of course) using readily-available client software.

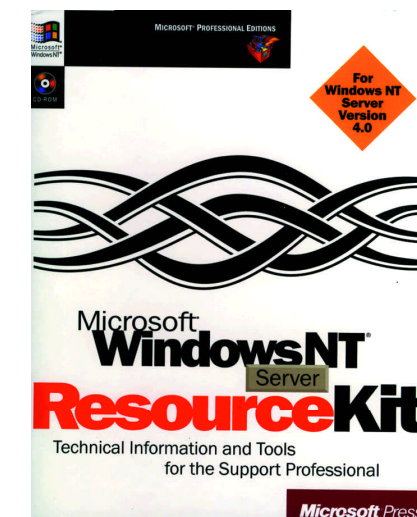


Above Tucked away in the Resource Kit is a strange 3D drawing and rendering program. Nice results are achievable with a little patience — evidently, patience is lacking here

Unfortunately, this Telnet service is buggy and crashed whenever I closed the session. And, it does not install using the



The one fat volume for the workstation Resource Kit might have benefited from being divided into two, purely to avoid damage to the reader. Price: £64.99 (incl. VAT)



The server Resource Kit is in three volumes: Server Resource Guide, Server Networking Guide, and Server Internet Guide. Price: £140.99 (incl. VAT)

files provided. You will need to go to the FTP site given in the documentation and get an updated .inf file.

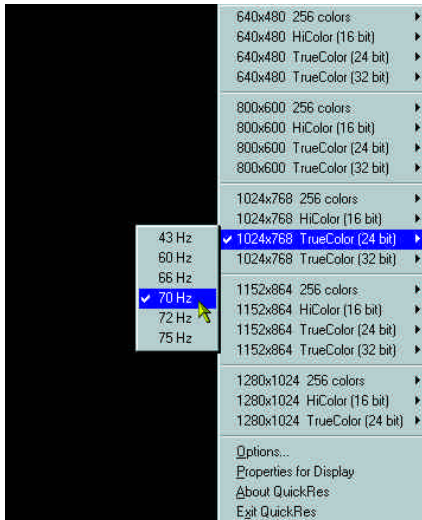
The Remote Command Service is a better alternative for most situations. Again, a service installed on the server handles client requests and returns responses. It will run either a single command or, if none is specified, create an interactive console session. This is a very useful tool. A NET SHARE command executed remotely is the only way I can think of to create a share on another PC from within a batch file.

However, neither of these approaches properly deals with the problem of starting windowed applications, which will start quite contentedly yet run completely out of reach and not announce themselves on the host's desktop — you just have to be careful not to start any in the first place.

Multiple (or virtual) desktops are a very nice way to organise your work, keeping appropriate tools together and accessible when you are working on related tasks. To some extent you can meet this requirement with thoughtful use of folders but there is no tidy way to switch from one task to another and back again without a lot of fuss. Multiple desktops should meet that requirement.

In the Resource Kit, there are three attempts to address this need and they are all rather disappointing. Desktops (which also seems to be called "Multidesk") looks the most promising but that is probably because it is the only one that seems to understand NT4.

On initialisation, there is a flurry of activity while it starts another copy of all the programs in your StartUp program group for your new, alternative, desktop. Although this introduced a resource overhead, it did suggest that the two desktops might be properly isolated. This misconception lingered until Exchange tried to tell me that I had a new mail message, whereupon both copies of the Exchange client I had running (one on each desktop) promptly hung. Attempts to kill them and restart just one, with and without Desktops running, failed so I had to reboot.



Above First seen in the Windows 95 PowerToys, QuickRes now graces the NT desktop

Nevertheless, Desktops continues to tempt me. It is easy to add more desktops and it is simple to use. I might have discovered more about it had the DESKTOPS.WRI file been on the CD like the help file promised, but it was nowhere to be found.

I could not get any sense out of Vdesk. Ctrl-F2 took me to my second desktop, just as it should, but there was nothing there except my wallpaper and no way to start any applications. The documentation shows how to set up the Registry to allow programs to start automatically but it seems like an awful lot of fiddling about — this is obviously a propeller-head's tool. And although it claims to allow the different desktops to log on as different users, which would be very convenient, I was unable to get it working.

There is a broad selection of console utilities that enable you to obtain information about users, groups, disks and security, in convenient forms for piping into further stages of a batch routine, as well as a nice little program called SOON which schedules a command to execute a number of seconds in the future.

SOON is a gift for anybody who likes to write self-retrying routines. For instance, if a batch command finds that it cannot continue for some reason, perhaps because a resource is in use, it can simply reschedule itself to try again later.

There are more performance monitoring and analysing tools than you could ever hope to use, including a version of Crystal Reports for scrutinising the event logs (this

```

Telnet - server1
Connect Edit Terminal Help

Welcome to the Telnet Service on SERVER1
Username: dale
Password:

ECHO is off.
welcome to the Telnet Service Beta. This service is still a
work in progress. Please check the following ftp location for
the most current version of this tool:
ECHO is off.
ftp ntrk.microsoft.com\telnetd\
TELNET IS OFF.
To report bugs or request more Telnetd information please email
me at telnetd@ntrk.microsoft.com.
ECHO is off.
C:\>cd kits\reskit35\telnet
C:\KITS\RESKIT35\Telnet>type readme.txt

TELNET SERVER BETA
version 1.0
Microsoft Windows NT 4.0 Resource Kit

INSTALLATION ERROR

PROBLEM:
The Telnet Server service does not install properly as described in the
TELNET.WRI documentation. When adding the Telnet service, the instructions
state to select the Remote Session Manager. However, the only selection
available is Telnet Service Beta (Inbound Telnet).

STATUS:
This issue has been addressed in an updated OEMSETUP.INF file for the Telnetd
service.

RESOLUTION:
Obtain a copy of the latest OEMSETUP.INF for the Telnet Server:
1) Connect to ftp://ntrk.microsoft.com/telnet_beta/beta.10/
<OR>
2) Connect to ftp://ftp.microsoft.com/bussys/winnt/winnt-public/reskit/nt40/
Download OEMSETUP.INF directly into your current Resource Kit Telnet
directory. This is typically C:\RESKIT\TELNET.
3) Follow directions in the TELNET.WRI file.

If you do not have access to ftp, e-mail RKINPUT@MICROSOFT.COM with the
following text in the subject line:

TELNET OEMSETUP.INF REQUEST

The RKINPUT feedback alias will reply with the corrected OEMSETUP.INF as an
attachment.

C:\KITS\RESKIT35\Telnet>

```

Left The Telnet service opens the possibility of running a console session on your server from across the world — firewalls and security managers permitting

Advanced Windows (Third Edition)

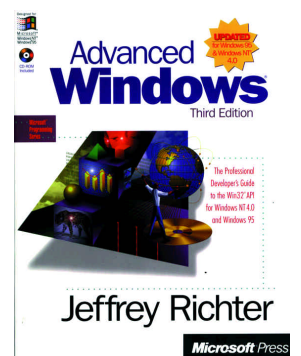
The author visits this subject for the third time, updating it for the latest versions of NT and Windows 95. And, for a change, the title is apt. This is how to program Windows for people who have already been doing it for a while but are now tackling more adventurous projects. The book is over 1,000 pages long and comes with a CD-ROM.

Richter discusses synchronisation, memory management, exception handling and more, having first covered some groundwork in memory organisation, processes and threads. There are clear diagrams and many lengthy examples (too lengthy, really) which illustrate the text.

Some of the subjects are complex, but even though the author has a clear style and explains them well, you should be prepared to start from the beginning if you want to make sense of the remainder of the book.

The CD includes multimedia demos of all the sample programs as well as a nauseating advertisement for Mr. Richter's training services.

Author Jeffrey Richter
Publisher Microsoft Press
Price £46.99
Available from Computer Manuals 0121 706 6000



is on the Server CD-ROM only). However, in my opinion, the whole thing is made worthwhile by the overdue appearance of QuickRes. At last we can change our screen resolution and colour depth in a couple of mouse-clicks.

PCW Contact

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DOS gags on an Apricot

All Chris Bidmead wanted to do was install DOS on his “universally compatible” Apricot. Just about anything else would have been easier. He isn’t going to suffer in silence, though.

Last month I was boasting about the universal compatibility of the Mitsubishi Apricot LS550 that is currently running SCO OpenServer on this network. But I thought I might have to eat my words when I tried installing DOS on a partition I’d reserved for that purpose. This was an overture to installing, of all things, Windows 95. I’ve had a lot of mail asking how you make Windows 95 co-exist with Unix and I was beginning to feel a bit cheap shrugging you off by saying “Windows 95 isn’t my thing”. So I thought I’d learn to suffer with the rest of you.

NeXTStep remains a lively environment, despite stories of the mother company losing interest in operating systems now that it is concentrating on web applications. The other day I downloaded a new update to my NeXTStep mail system: EnhanceMail version 2.0b5. Among other extensions of the official NeXTStep Mail.app, this package can translate ASCII smileys into little yellow faces with the appropriate expression. To give you a better look, I’ve dropped in a close-up window using Magnify.app from Eric Tremblay’s magnificent Walnut Creek Nebula CD-ROM shareware and freeware toolkit (eric@cdrom.com). You’ll notice, too, the X-Face enhancement to Mail.app: that’s the black and white mugshot of me in the top right-hand corner. The picture’s contained in the X-Face header string which can travel as ASCII via any mail system and be resurrected, cross-platform, by any mail reader with an X-Face handler

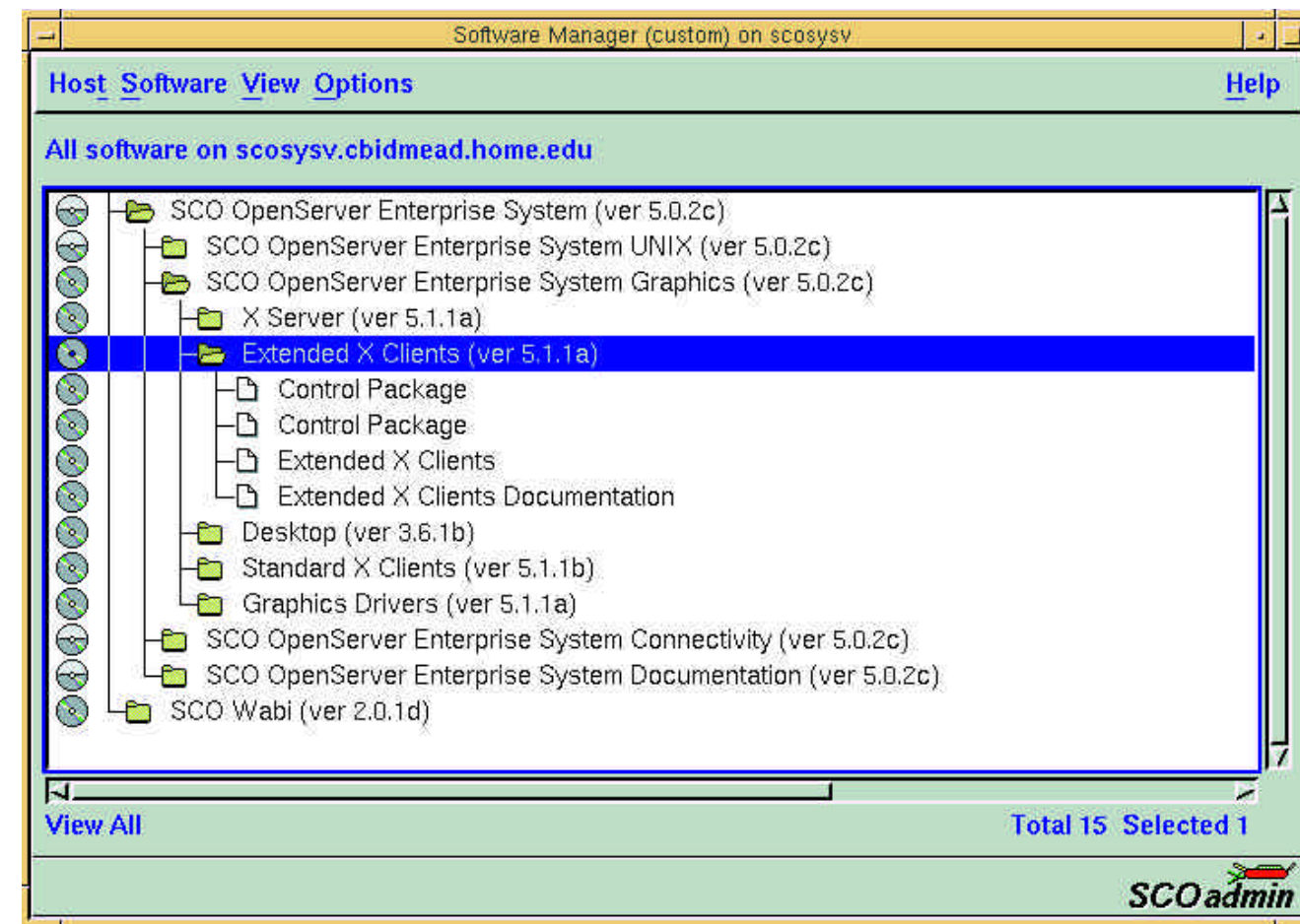
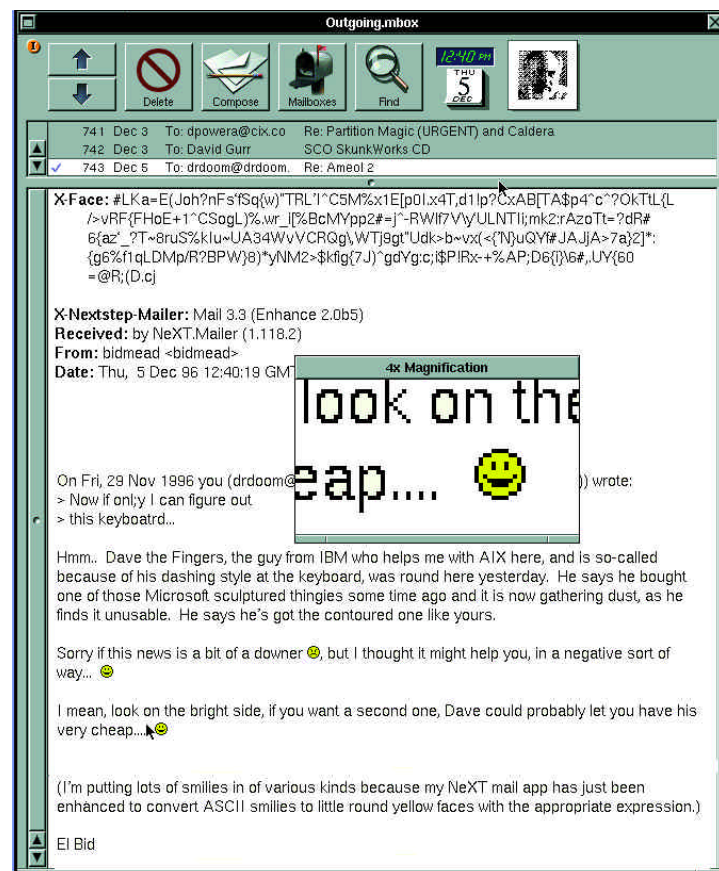
Well, I’m still suffering. But more of that in a moment. I was using a copy of MSDOS 6.2 that happened to be lying around, and the catch was that it was the Upgrade version. This looks for an existing version of DOS on the hard disk and offers to replace it. But if there’s no DOS it bows out politely, inviting you to contact your vendor for the full package.

This nonsense is all to do with the way IBM and Microsoft had agreed to carve up the DOS market, back in the eighties. I certainly wouldn’t encourage my readers to breach the fine print, but my personal

approach to this is to exit from the DOS installation at the first chance by hitting F3, and then run FORMAT C: followed by SYS C: from the command line. This puts the DOS 6.2 command.com and hidden boot files onto the hard disk. Then I run SETUP, which goes and looks at the hard disk and says to itself, uh-huh, seems there’s a copy of DOS on there already, so it’s OK to proceed. Well, that’s the theory. But in the case of the Mitsubishi Apricot, SETUP came back this time with “Incompatible Hard Drive”, and then a bunch of stuff about having to read things in manuals.

I started to worry about the 1.2Gb hard disk and went to look at the Apricot’s comprehensive BIOS setup. The BIOS is written by IBM, which reinforces my feeling about general compatibility, but I knew that DOS is easily upset by any departure from the straight and narrow, which at one time in its history included any disk greater than 32Mb capacity.

The BIOS offers a couple of disk-drive parameters that seemed relevant — “enhanced”, or “compatible”, which I guessed must be to do with whether the addressing is in logical blocks or old-style sectors. But changing these would wipe out the



SCO offers a comprehensive software manager for installing packages. But it needs to install a huge number of config files every time it looks at the CD, to see what’s there — a process that takes over five minutes. Having transferred them, you can install a single package, after which the software manager throws away the config files. If you want to go back for another package — yes, you’ve guessed it — the software manager has to spend another five minutes reinstalling the config files. Not a feature, admits SCO’s David Gurr; a bug to be fixed in the next version...

three hours or so it had taken me to install SCO, so I wasn’t inclined to mess with these as a first resort.

The next thing I did was to run DOS’s FDISK to assure myself that SCO hadn’t been so silly as to put the DOS partition high up on the drive where DOS couldn’t find it. DOS uses the BIOS to read and write from disk drives and traditionally the BIOS routines aren’t able to get to those parts of the disk above the 512Mb limit. But no, FDISK revealed the DOS partition to be the first one on the drive.

Nothing for it then but to read those manual entries to which SETUP was pointing me. With a sinking heart I turned to the DOS manual chapter called “Diagnosing and Solving Problems”. This is the wasteland where I seem to have spent much of the eighties — and Unix was supposed to be my escape from this. The section headed “Setup displays the ‘Incompatible hard disk or device driver’ screen told the whole story. Without apology, the DOS manual declares that

SETUP regards any drive on which it finds a Unix partition as “incompatible”, even if there’s a perfectly good, usable DOS partition waiting for the install. So much of this myopic megalomania surrounds Microsoft’s approach to alien products that I no longer regard it as an accident. I think Microsoft goes out of its way as a matter of policy to encourage the view that non-Microsoft operating systems are somehow weird and dangerous. Actually, the opposite is closer to the truth.

Got the T-shirt

If I may put the SCO/Windows 95 story on the stack for a moment... I got a T-shirt sent to me the other day with a button on it that looks like the famous Windows 95 Start Button, except that it says “Stop” with the words “Bill Gates” underneath. The legend on the back reads “Before he stops you...”. This came from Martin Houston (Martin.Houston@ukuug.org), a Unix consultant and organiser of the UK Unix Users’ Group which distributes the excellent

“news@UK” newsletter. Martin is an outspoken Linux enthusiast and although I share many of his views I’m not sure I’d go so far as wearing a T-shirt that states “Stop Bill Gates”.

I would like Microsoft to put a stop to these anti-social software practices, though. It’s time it learnt to live with the rest of the industry, rather than building software on the assumption that everything non-Microsoft is all going to go away quite soon. And I really hate the attempt by Microsoft to label its highly proprietary, uncooperative software “Open”. Around this time last year Michael Tilson, CIO of SCO, was reported in UniForum’s newsletter (www.uniforum.org/spool1/html/publications/uninews) as complaining about just this. “The term ‘open’ has been hijacked,” said Tilson. “Because ‘open’ is good, everyone labels whatever they sell as ‘open’.”

Incompatible hard disk — phooey!

Meanwhile, back at the Apricot, Microsoft is the company behind this version of DOS

that is declaring my hard disk "incompatible" simply because it has an SCO Unix partition on it. The straightforward solution turns out to be abandoning the automated SETUP routine and doing a manual install of the various files. Alternatively, there's an arcane command line switch, `SETUP /u`, that tells the installation not to make damn fool guesses about the drive and to just get on with the job.

The daft thing about all this is that most OS partition schemes have well-defined "partition signatures" (values buried at the beginning of the boot record) which identify them. So any operating installation procedure written by someone with half a brain ought to be able to come back and say "You have SCO partition on this drive, but there's plenty of room for DOS in another empty partition. Shall I go ahead and install?"

SCO OpenDesktop

I told you last month about how confused I became at Open Desktop's skulduggery in pretending that the Apricot's ATAPI host connector is SCSI. I was talking about this to Steve Perkins, the technical products manager for Western Digital in the UK, and he tells me that IDE's evolution has brought the interface very close to SCSI and the command sets are now similar. So what SCO is doing isn't as convoluted as it looks.

Having got over the SCSI/ATAPI hurdle, installation went smoothly. Admittedly it failed to automatically sniff out my network card, but it returned the right interrupts once I'd defined the type of card (a 3Com EtherLink II). I ran into a small problem defining the mouse: the one on the Apricot is what's normally called "PS/2 Type", except that this wasn't on the list of options. Foolishly I settled on "Bus Mouse", which completely immobilised my mouse cursor when X brought up the graphical desktop. This is a trivial problem, but one that can stop the show. After five years of messing about with Unix I am still a raw beginner in situations like these. I didn't know how to fix it, but what I have learnt in those five years is how to go about *learning* how to fix it. And Unix is a great teacher.

The first lesson of Unix is "DON'T PANIC". In real life this is just an empty slogan but inside Unix it's an eternal verity. With Unix you never *have* to panic, because it is an operating system that panics for you — panic being the term for what happens

The ISDN connection

There are at least three ways to use an ISDN connection from a personal computer. You can put a terminal adaptor (TA) where the modem was and connect to the PC with a serial cable. You can fit a TA into your PC like an internal modem. Or you can set up a kind of ISDN router on your network, so that all your workstations have access to the ISDN line. Paul Lynch, of P & L Systems, whose ZyXEL Elite 2864i TA I'm currently using, has offered to help me set up a router configuration based on the ZyXEL Prestige 2864i Remote Access Router which his company also sells. This sounds like a lot of fun and very much in keeping with the multiplatform tone of this column. But for now I'm getting to know ISDN the easy way — and it really is incredibly easy. First, you need an internet provider which offers ISDN (this seems to be most of them, these days). The ISDN line may be on a different number, in which case you need to change your dial string. While I was doing this I also changed the dial command from ATDT (tone dial) to ATDI, which is the Elite's string for initialising an ISDN connection. Most of the ISDN internet connections I've been trying, like the very friendly and fast Astra Internet service run by Chris Comley (ccomley@cix.co.uk), use the PAP authentication scheme I discussed in my January '97 column, so I had that already in place. And that's really all there is to it. It works!

when the operating system decides it's come across a fatal error and can't run any more. Typically it will put up a screen message that states something like "System panic — dumping core" and close itself down as gracefully as it can, creating a diagnostic log as it does so. You don't get this very often, and I wasn't getting it now. I just had a stuck mouse on the graphics screen, with the real Unix still chugging merrily away underneath. Happily, as with Linux, SCO allows you to switch out of the graphics screen into one of several virtual terminals by hitting Ctl-Alt and a function key. I logged into the virtual terminal as root and began sniffing around.

By long Unix tradition, the different peripheral devices like the mouse are stored in the `/dev` directory. They look like files and to some extent can be treated as such, but it's better to think of them as datachutes through to the actual devices they represent. If you know how, you can create your own `/dev` devices using a tool called `mknod`. SCO provides a friendly front-end to `mknod` in the form of a shell script named `mkdev`. I found this out by running `apropos` devices at the command line (`apropos` is an alias for `man` with the `-k` parameter, which states, "give me a reference to all the man pages that contain the following key word").

Then I consulted the manual (by running `man mkdev`) to find out how SCO does this. The manual told me to run `mkdev` with "mouse" as a parameter. When I did this, the script trotted me through the options for building the appropriate mouse device (or more probably, installing the correct link from a ready-made device; happily, `mkdev` shielded me from these grizzly details). It turned out that my PS/2 mouse is something SCO prefers to describe as "Low Resolution Keyboard Mouse"; a rather

weird description, so it's hardly surprising I missed it first time around. But call it what you will, my mouse was now working.

What still isn't working is Windows 95. You can install Win95 in the DOS partitions that SCO creates but then it goes and trashes the SCO boot. I reached for the proprietary boot manager, System Commander, to try to repair the damage Win95 had made to my master boot record, but it couldn't. The manual, however, goes into a description of the damage at some length and gives a very elaborate five-step procedure which it describes as "Risk Free Windows 95 Installation".

The manual also warns that once you have Windows 95 safely ensconced, you can still wreck your access to other operating systems when you install the bonus package of utilities and screen furniture that Microsoft calls Windows Plus. System Commander (from POW! Distribution at dpower@pow-dist.co.uk) offers ways around this, too, but having reinstalled SCO (which, in turn, seems to have trashed Win95) I decided it had all been too much excitement for one month.

As an added complication, Daniel Power at POW! has just sent me the latest cut of Partition Magic, originally an OS/2 partition mover and now a fully-fledged multiple operating system partition manager. This version comes complete with a licensed copy of OS/2's own Boot Manager so it's now an alternative to System Commander. If I'm feeling strong enough next month I'll give one or both of these a proper go and let you know how I get on.

POW! Contact

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The Warp factor

The surging popularity of networked computing has brought out the best in Warp, with its development into a highly competent internet tool. Terence Green predicts good things for 1997.

One of the pleasures of the Hands On OS/2 section for me is the amount of feedback and the way it shapes the column each month. Because of the way I write the piece, it may not be apparent that large sections appear as a result of email received. The feedback goes well beyond simple queries. Readers correct my errors as often as they draw on my resources, so if you appreciate the column, remember that thanks are due for the contributions of many un-named readers.

It did occur to me when I took on the OS/2 column, just as Windows 95 was making its way into the world, that many people considered OS/2 at best a legacy operating system. But, some 16 months later, Warp 4 has grown into an

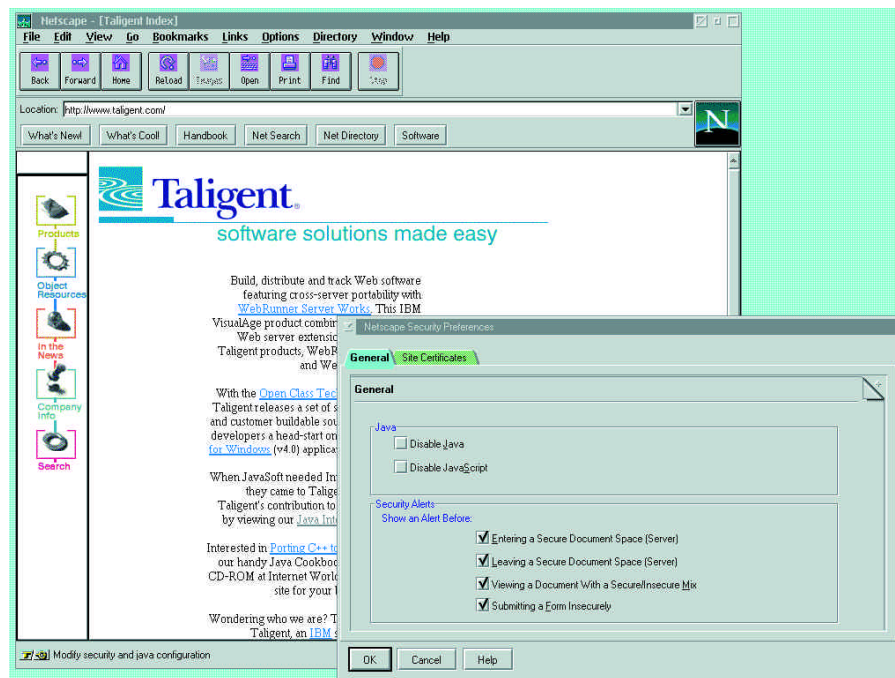
extremely competent internet tool just as interest in networked computing has grown to fever pitch. So, while 1996 saw a lot of speculation about the future for Warp, 1997 looks like being a good year for its users.

Warp's focus on the internet started back in 1994 when Warp 3 with the Internet Access Kit shipped. Since then, the internet has become the prime driver and Warp 4, the first desktop operating system to be Java-enabled, is obviously well placed. But

internet development time is measured in months, and operating systems traditionally take years to develop.

To that end IBM decided in 1996 to consolidate and prepare for more rapid upgrades. The press reported this as "freezing the kernel" and predicted (yet

not make any major changes to the kernel until 1998 when Warp 5 is pencilled in. That probably means no major alterations to the input queue fixes already in Warp 4 and almost certainly means no SMP-enabled end-user version. Instead, we can expect to see Warp 4 both gaining new power-user



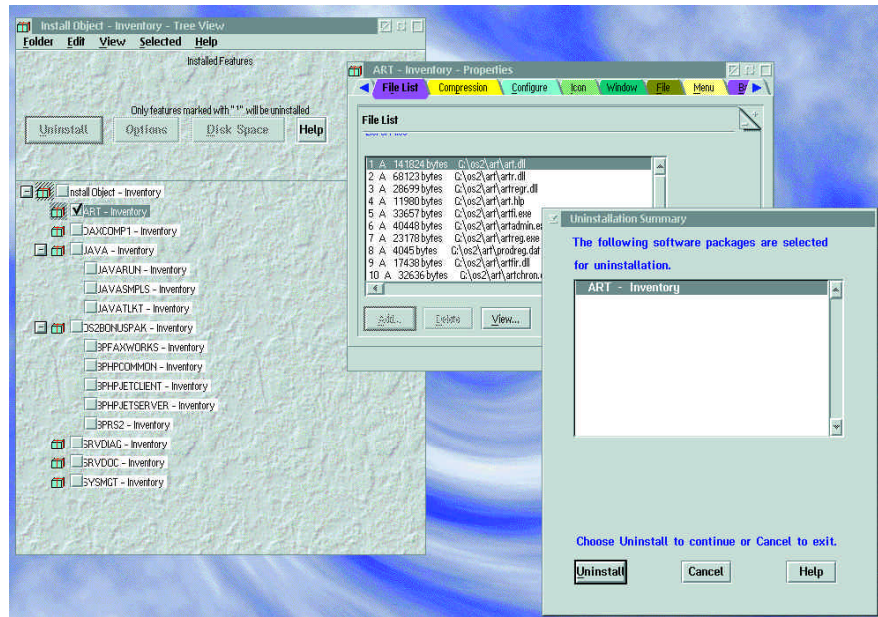
Taligent frameworks are being incorporated into Java to ease internationalisation for developers. See www.taligent.com for more details and don't forget to enable Java in Netscape for OS/2; it's disabled by default

again!) OS/2's demise. In fact, what is happening is that the core of Warp is being kept stable so that sub-systems, especially those concerned with the internet, with Java, and with communications in general can more easily be adapted, enhanced or added to in order to exploit the emerging uses that are being discovered through the internet and the web.

During 1997 IBM plans to ship lots of modular enhancements to Warp 4 but will

features for Pentium-powered systems while also slimming down to tackle emerging markets such as set-top WebTVs and other embedded systems.

There are obvious benefits to the user from the set-top box approach modelled on the network computer because it's a pay-as-you-go system which will take Warp into the home far more effectively, at lower cost, and with much greater ease of use for consumers than having to tussle with



Above You can eliminate the irritating registration screen using the uninstall utility in \OS2\INSTALL\Installed Objects

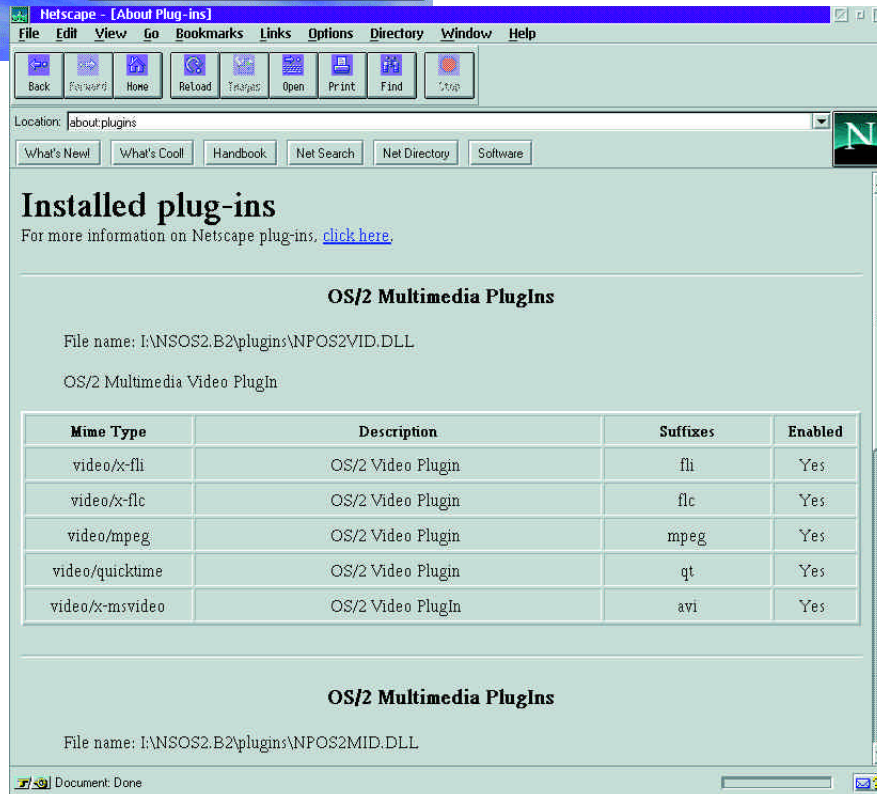
Right The Plug-In situation with Netscape for OS/2 is complex and differs between Warp 3 and Warp 4. For a fuller explanation follow the URL link on the Help/About:Plug-Ins screen

installing and configuring a Pentium box. Meanwhile, we nerds can continue to expand our Warp 4 systems through the modular enhancements promised for 1997. Quite how IBM plans to make the 1997 enhancements available for Warp 4 users has not been disclosed at the time of writing, but now this is in print it would be a good time to check the latest news.

Any answers?

It isn't always possible to answer every query satisfactorily and sometimes I can't answer them at all. Here are a couple of queries that have been hanging around unanswered. Currently I'm having difficulty discovering whether there are device drivers for the Hauppauge WinTV card and for the Epson EPL5500 laser printer, not the Windows system version. There was some discussion about a set of Epson printer drivers for OS/2 being prepared by Epson Germany but they were not yet ready, and it seemed that Epson was hoping to charge for a driver diskette.

Another request I haven't solved is whether there are any Windows 95 HPFS readers. I'm aware of a DOS-based HPFS reader and there's a workaround for the



unwillingness of Windows NT 4.0 to see HPFS drives, but is anyone aware of any utility which will enable HPFS drives to be seen from Windows 95?

Talking of readers who add to the knowledge bank, here are a few quick tips. If you have one of the older NEC CD-ROM drives such as the NEC 2xi and you're having difficulty installing OS/2 or accessing the drive, try turning parity checking off in the SCSI BIOS.

And then there are readers who are just weird! One writes to say that he has mixed feelings about Windows 95 but loves the

image quality which he adjudged by viewing the same (Windows 95) bitmap in Windows 95 and OS/2 Warp. Apparently it looks much crisper and sharper in Windows 95. Well, one would hope that an image shipped with Windows 95 would look good, but how many factors are involved? First there's the video device driver itself, then the resolution, then the refresh rate. To make an accurate comparison, all of these should have identical settings, particularly the refresh rate.

The same reader also wants to know whether to stay with OS/2 or switch to Windows NT. This question has become common since Windows NT 4.0 arrived. I guess the first consideration is how much you want to pay for your operating system,

as Windows NT workstation costs a lot more than OS/2 Warp. The next consideration would be your applications. Our reader wants a "top-notch" office suite but can't wait any longer for Lotus SmartSuite. Well, it's okay to run Microsoft Office versions up to 4.3 in a Warp Win-OS/2 session, but not Office 95 or Office 97 which are exclusively Win32.

You should also consider which legacy applications you might wish to run, as some DOS and Windows 3.1 applications run very slowly, if at all, in Windows NT. On top of that you would need to check whether

Sun's HotJava browser will soon be available for Warp

you have any specific applications which are poorly supported on Windows NT such as fax software and games. Further considerations are that Windows NT does not support power management and that it only supports static PCMCIA insertion prior to booting up, not hot insertion/removal of PC Cards.

As to whether Windows NT is more reliable or stable than OS/2 Warp, I don't feel the question has a simple yes or no answer. Depending on the quality of the hardware and the associated device drivers, both Windows NT and OS/2 Warp can range from rock-solid to flaky as hell.

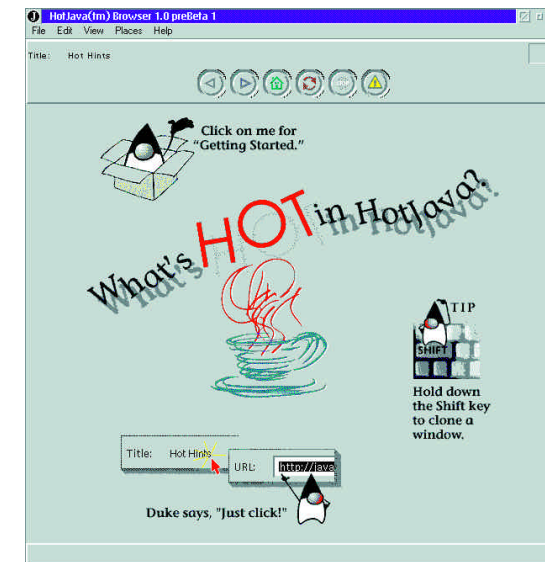
Hints and tips

I've sent Fixpak #26 to the cover CD. This is the latest official release dated 18th November 1996. It includes several important fixes for bugs introduced with Fixpak #17 which appeared on an earlier PCW Cover CD and also includes the Open32 support required for applications developed with the Developer API Extensions. It is also required if you wish to run Windows 3.1 Plug-Ins with Netscape for OS/2 beta 2 and later.

Some interesting fixes in Fixpak #26 include a fix for the "994" message received when attempting to view files on a Windows NT Server, and the ability to reserve drive letters in order to ensure a consistent address for CD-ROM drives. See the XR_W026.1ST file for more details. Also note that you must use the latest Corrective Service Facility (CSF) boot disks in order to install FixPack #26. These disk images are included on the cover CD.

A couple of tips for those who have installed or plan to install Warp 4 over Warp 3. Warp 4 creates a new desktop and saves the old one along with any printer objects in the Previous Desktop folder. Look in here for your printer icons and drag them to the new Warp 4 Desktop.

If you upgrade Warp Connect to Warp 4 and see a blue screen with a clock which turns to a blank Desktop when you press



CTRL-ESC, reboot and press Alt-F1 when a white blob appears top left of the screen. Select F2 to bring up a command prompt, change to the :OS2\INSTALL subdirectory and type MAKEINI INSTALL.INI

INSTALL.RC, then press Enter. Restart the system, press ALT-F1 and select F6 to disable hardware detection. If you have installed FixPak #22 over Warp 3, do not use the Warp 4 Easy Install without first removing FixPak #22. This is because Warp 4 shipped at the FixPak #20 level. You can use the Advanced Installation and when asked whether to overwrite newer files reply "yes".

If you have a ProAudio Spectrum 16 and the IBM-supplied Andrea microphone, you must obtain the optional battery pack for the microphone to work. The tiny power adaptor (easily overlooked in the packaging) is required for Creative Labs SoundBlaster boards.

If you lose the new Warp Sans font, the most likely cause is because you installed a new video driver and allowed it to overwrite the DSPRES.DLL file. Replace the correct DSPRES.DLL by rebooting and pressing ALT-F1 when the white blob appears top left. Call a command prompt with F2 and enter the following;

```
UNPACK X: \OS2\INSTALL\VGA\VGA
/N: DSPRES. DLL
```

where X: is the Warp 4 boot drive. Exit the command prompt to reboot.

PCW Contact

Terence Green can be contacted by post via the PCW office or at os2@pcw.vnu.co.uk

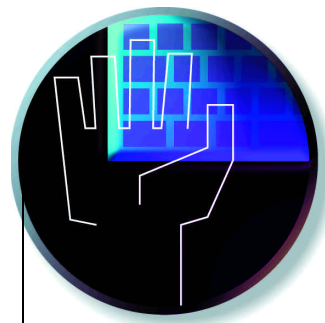


Table manners

This column is now under the sterling stewardship of Tim Nott, who in his time has probably used every word processor ever produced. He kicks off with some tips for tables in Word.

No, it's not a misprint, or a failure of the PCW Tim Discrimination Algorithm. The Hands On cabinet has been reshuffled — Gabriel Jacobs and Panicos Georghiades are the new ministers for Windows 3.1 and DOS, and I've wound up here, while continuing with the Windows 95 portfolio. So, well, hello, all you word processing folk.

I'll start by declaring interests. It will probably come as no surprise that, like 80 percent of the market, I use Word for Windows for my daily needs. Well, actually, that 80 percent figure is a tad misleading: Word accounts for 80 percent of new sales but there must be many users who haven't bought a new word processor recently. So while, inevitably, Word will figure frequently in this column, all the rest of you must stand up and be counted.

Having done a few word processing group tests, I think I can say I've used every package currently available, and a few that aren't. So bring me your WordStar, WordPerfect and WordPro queries. Bring me your Accent, Universal Word, Toplevel, Word Express, Q & A, and Professional Write problems. Bombard me with questions on LocoScript and Protex. I probably won't have a clue, but what the hell, it's worth a try. And if you're using CA-Text, please consider upgrading.

Turning the tables

One thing I really missed when I abandoned the joys of LocoScript on the Amstrad PCW was that you could type +rj to right-align the rest of a line so that, for example, you could have a letter with a right-aligned date on the same line as other, left-aligned text.

Strangely enough (as I've just discovered) you can do this in Windows

Word by right-aligning the line and inserting a tab where you want the break. WordPerfect users can still do this with an Alt+F7. With Word, however, the equivalent Control + R affects the entire line, and you have to faff about creating a right-aligned tab stop at the right-hand margin. This is a fiddly business: first you have to click through the varieties of tab stop at the left of the ruler until you find the correct one (a reversed L) then click just inside the right margin on the ruler (Word won't let you click dead on) then drag it into place. There must be an easier way.

There is an easier way — tables. Before you run and hide, bear in mind that the tab function, like the QWERTY keyboard, is a piece of low-tech inherited from typewriting although it has been enhanced by the provision of right-aligned, centred and decimal point-aligned variations. Save the Tab key for getting around dialogue boxes. One advantage of a table is that you can justify each cell separately. So a two-column, one-row table can hold a left-aligned date and a right-aligned "Our ref.". Add another column, and you can have a piece of centred text as well. It's much more powerful than conventional tabs. Although Word has a

Fig 1 Don't use tabs, use tables

variety of bullet and numbered list formats if, for instance, you want to set up a list with each keyword in a separate column to several lines of explanatory text, it still takes much messing about with styles, paragraph indents, tabs or the tiny ruler buttons. With tables, it's easy.

To take a more sophisticated example, consider creating a cast list for a play. You want the character names in bold, on the left, right-aligned, with a small gap between these and the players' names, left-aligned and in italics. As Fig 1 shows, it's easy: select each column, either by clicking when the cursor changes into a vertical arrow at the top of the table, or from the Table/Select column menu command. You can then format wholesale and drop back into individual cells for individual treatment.

Note that the dotted grid lines don't print but you can drag the vertical ones around to change the size or position of columns, which is easier than messing with the ruler. If you do want printed gridlines, use the Format/Borders and Shading

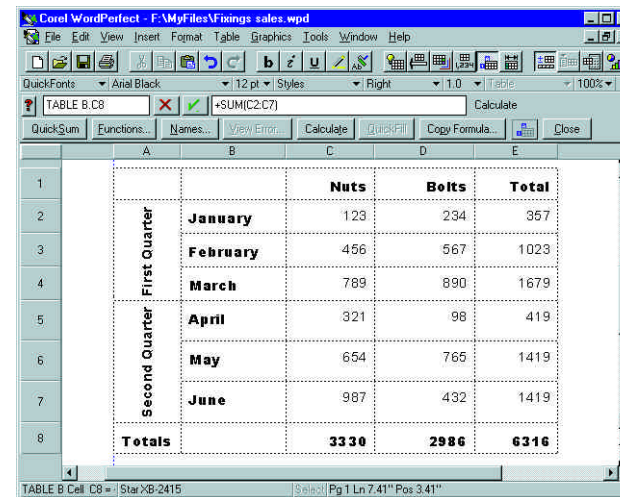
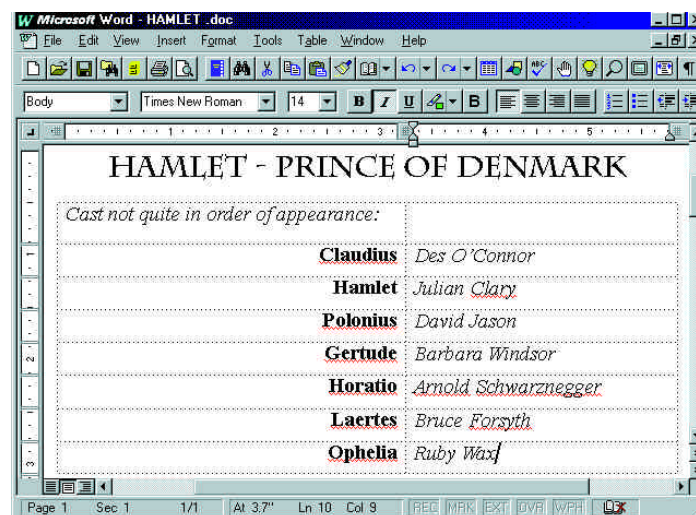


Fig 2 A few of the things you can't do in Word

command or toolbar. If you find the grid lines distracting, you can turn them off from the Table menu.

The procedures in WordPro and WordPerfect are almost identical. All three have a miniature grid which drops from a tool button in which you drag out the initial number of rows and columns. All have commands for inserting extra rows and columns should you change your mind. All use the Tab key for moving to the next cell; if you reach the end of the table, this will create a new row. With WordPerfect, selecting columns is a little different as you have to double-click with the vertical arrow to select an entire column.

There's a lot more formatting you can do with tables, and this is where Word starts to look very much the poor relation. You can't vertically-align text to the bottom or centre of a cell, nor rotate it. Someone asked recently, on CIX, how to include a landscape table in a portrait document, while retaining the portrait positioning of the headers and footers. You can't do this in Word — not without inserting the contents of each cell as a WordArt object. And believe me, you really don't want to do that. Also, unlike the others, you can only split or merge cells horizontally if, say, you wanted to subdivide "First Quarter" into "January", "February", "March".

There's a lot more you can do with tables besides laying-out text. Word Pro, for example, lets you enter 1-2-3 style formulae in a cell, which update automatically, just like a spreadsheet. There are buttons to "Smart Sum" a row or column, and optional spreadsheet-style row and column headings. WordPerfect does even better with a spreadsheet-style formula entry bar. By comparison, Word again fares badly.

Though you can insert formulae as "fields" it's horribly difficult to use and buggy in operation. If, for example, you use the SUM(ABOVE) function and then delete one of the values in the column, it will ignore all entries above the deletion. Worse, it doesn't update the fields automatically; you have to do this manually with the F9 key. It may be that Microsoft

cannot bear the thought of anyone not buying Excel and not using the wonders of OLE 2 to create in-place-editable spreadsheets.

Despite the lacklustre performance of Word's tables, they can nevertheless be a very powerful automation feature. I use a Word table to keep track of each article I write and to generate invoices. Though real men would use Excel or Access for this, I find it's quick, it works, and it only took me a week or so to set up.

By next month's column I will have the final release version of Office 97, so I'll report back on if and how things have improved.

Quick FAQs

Q. How can I get Word to automatically insert the date in a letter?

A. The simplest way in Word 6 or 7 is to create a bookmark called "date" (or whatever) where you want the date to appear in the letter template. Then create the following (or add to the existing) Autonew macro:

```
Edi tGoTo "date"
InsertDateTime . InsertAsField = 0,
.DateTimePic = "d MMMM, yyyy"
```

The "InsertAsField = 0" ensures the date is entered as plain text, rather than being recalculated each time you open the document. The "DateTimePic =" determines the appearance of the date; in this case "1 February, 1997".

Q. How can I get rid of the "shadow cursor" in WordPerfect 7? It's driving me mad!

A. Me too. When I first saw this, you couldn't. But in the version I've got now (7.0.1.9), you can go to Edit/Preferences/Display and turn the thing off (Fig 3).

Macro of the month

Have you ever wondered why your prose lacks that technical authority seen, for instance, in corporate press releases? It's because you're not availing yourself of the specialised language invented for the sole purpose of sounding important. I bet you still call a spade a spade, rather than a fully-mobile personal earth-moving solution.

Smarten your act up with this — the Real-time Bovine Excrement Generator. It's in WordBasic, but it's a very simple piece of code and should be easy enough to translate into other macro languages.

Sub MAIN

Dim adjective1\$(10)

Dim adjective2\$(10)

Dim noun\$(10)

adjective1\$(0) = "fourth
generation"

adjective1\$(1) = "real-time"

adjective1\$(2) = "autonomous"

adjective1\$(3) = "extended"

adjective1\$(4) = "leveraged"

adjective1\$(5) = "synchronised"

adjective1\$(6) = "logistic"

adjective1\$(7) = "integrated"

adjective1\$(8) = "optimal"

adjective1\$(9) = "32-bit"

adjective2\$(0) = "parallel"

adjective2\$(1) = "reciprocal"

adjective2\$(2) = "intranet-enabled"

adjective2\$(3) = "wide-band"

adjective2\$(4) = "upsized"

adjective2\$(5) = "client-server"

adjective2\$(6) = "synergistic"

adjective2\$(7) = "floating-point"

adjective2\$(8) = "multiplatform"

adjective2\$(9) = "networked"

noun\$(0) = "paradigm-shift"

noun\$(1) = "localisation"

noun\$(2) = "lead-time"

noun\$(3) = "monitoring"

noun\$(4) = "solution"

noun\$(5) = "interface"

noun\$(6) = "stratification"

noun\$(7) = "understructure"

noun\$(8) = "overview"

noun\$(9) = "time-frame"

x = Int(Rnd() * (10))

y = Int(Rnd() * (10))

z = Int(Rnd() * (10))

waffle\$ = adjective1\$(x) + " " +
adjective2\$(y) + " " + noun\$(z)

Insert waffle\$

End Sub

What this does is set up three "arrays" (the DIM statements) to hold the data. The next 30 lines assign strings to those arrays — the first item in an array always occupies the zero slot. Next, it generates three random integers between 0 and 9, stores the corresponding adjectives and nouns in waffle\$, with spaces in between, and inserts this into the document. You can add more words; just make sure that the numbers tally in the DIM and RND statements. If you don't fancy typing all that in, look for WAFFLE.TXT on our cover-mounted CD-ROM. I hope that this will bring that badly-needed element of fourth-generation client-server overview to your writing.

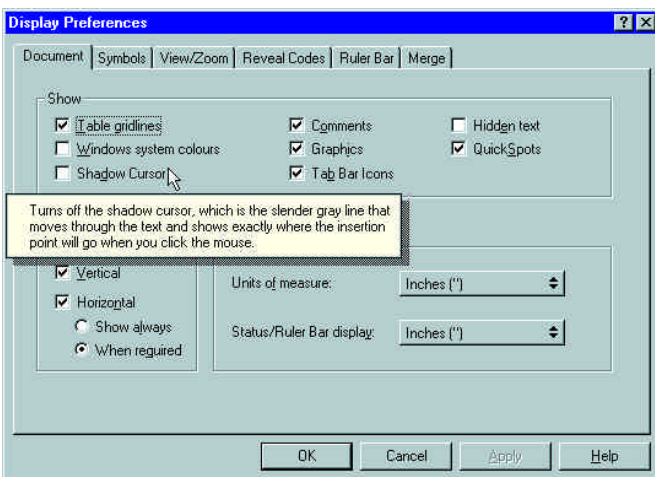


Fig 3 How to turn off that pesky shadow cursor

kept the Windows 3.1 Write. Oh, and don't bother attempting to go via the RTF format, because it buggers that up as well.

Q. How do I get a tab into a table cell?

A. Why bother? Just create another column or split the cell. But if you must, Control + Tab is the way forward in Word and WordPerfect. WordPro users need Shift + Control + Tab.

Q. How can I set up a style in Word that can be applied to a single word or phrase? Whenever I try this it changes the entire paragraph.

A. Go to the "Format/Style menu". Hit the "New" button, then select "Character" from the "Style type" drop-down list. You will be

able to define all the font properties — name, size, emphasis, spacing, raised/lowered and colour — but not background shading. You can also define the proofing language so if, say, you are using Greek or Russian words, the appropriate spelling-check dictionary will apply. Even if you don't have these, it can be worth doing, as they will not get flagged as errors in English. Character styles get flagged with an "a" in the drop-down list instead of the usual paragraph marker (¶) symbol.

Q. In WordPerfect 7, I want to create double-spaced text. But I only want three, not four, blank lines between paragraphs.

A. Easy. Set the line spacing of the style (or selection) to 2, but set the paragraph spacing to 1.5. The latter is a function of the former, rather than the standard spacing.

Q. I've edited and saved a Word document in WordPad. I was really impressed how it could do this, until I reopened it in Word. Although all the font formatting has remained the same, everything is now in "Normal" style and things such as paragraph spacing have disappeared.

A. Yes, that's normal (if unacceptable) behaviour for WordPad. Together with the fact that it takes as long to load as Word 7 on my PC, this is why I never use WordPad. For quick-and-dirty word processing, I've

PCW Contact

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The place to be

This column must be well-read by Microsoft employees because many of your past spreadsheet gripes have been dealt with in the new Excel 97, as Stephen Wells explains.

Coincidence? I don't think so. It's obvious that readers of this column are typical of the Excel users to whom Microsoft claims it listens. Just look at the number of features in Excel 97 that solve problems which have been highlighted in this column in the past.

For instance, last month (*PCW*, Feb) a doctor was asking for ways to immediately draw attention to certain medical conditions on a worksheet: Excel 97 now has a Conditional Formatting dialogue box which offers many more options than previously available. In the example in **Fig 1**, patients' weights are shown in column A. Column B highlights their condition. The cell formula is `=IF(A9>14, "OVERWEIGHT", IF(A9<10, "UNDERWEIGHT", A9))`

In this simple scenario, anyone over 14 stone is considered overweight, anyone under ten stone is deemed underweight, and between those extremes their weight is simply repeated in column B.

The Format menu offers a new option, Conditional Formatting. You can enter up to three options. So, if you include a cell

condition that doesn't meet any of these set criteria, you have (in effect) four options. Each can start with a choice of "Cell Value Is" or "Formula Is". The first depends on the value or formula in the formatted cell. The second allows you to set the formatting, dependent on data or conditions other than in the selected cell. It might be today's date or a total at the foot of the worksheet.

In **Fig 1** there are two "Formula Is" conditions. Condition 1 is

`IF(B9="OVERWEIGHT", A9)`

and Condition 2 is

`IF(B9="UNDERWEIGHT", A9)`

The format set for Condition 1 is a bold font, in red, with a pale yellow cell background. For Condition 2, it is a regular font, in green, with a pale blue background.

Allowing functions to be used to determine formatting will be a popular feature in a wide variety of applications. The content of a cell which is, say, more than 30 percent of the total of a row or column, can be highlighted. If you wanted any even whole number in the range E2:E80 to be purple, you could conditionally format E2 as

follows:

`=MOD(E2, 2)=0`

and then paste that format into the rest of the range. The format formula will be changed appropriately by the

Fig 1 Excel 97 expands the options for conditional formatting. It can control font style, underlining, borders, shading and patterns

Paste tool. To see which cells on your worksheet have Conditional formatting, choose Edit, Go To, Special, Conditional formats.

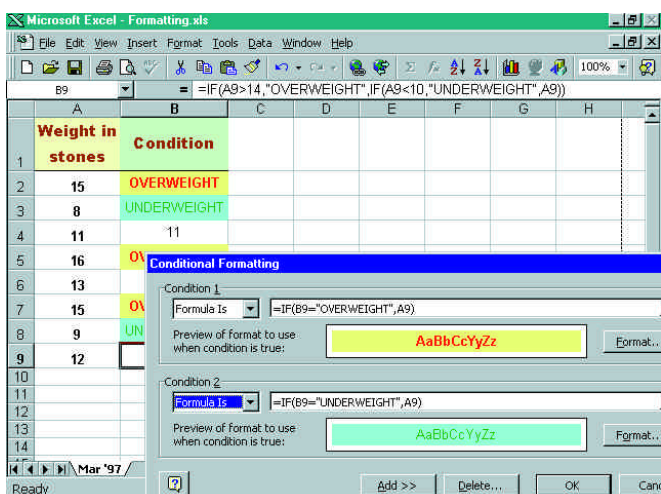
A smarter chart

Two other recent requests were for better ways to chart stock and commodity prices (*PCW*, Feb). These investors had to make hundreds of plots and needed a better method of specifying dates along the x-axis. Now Excel 97 comes to the rescue. Previous versions allowed for 4,000 points per data series and a maximum of 32,000 points for all series in one chart. These specs have now been increased to 32,000 for a 2D chart and 256,000 points for the whole chart. And, there is a new option for specifying that an axis refers to dates.

In fact, it has never been easier to make and adjust charts. I must confess that in the past I used to get confused by all the nomenclature of chart objects. Now it's a doddle. Not only does the Chart Wizard now have tabs, but also a small preview window displays changes as you make them (**Fig 2**).

Whether you decide on a High-Low-Close stock chart, with or without the day's sales volume, or an Open-High-Low-Close chart, with or without volume, the new Step 1 dialogue box of the Wizard can show an example using your data. You can also print your worksheet data in a grid at the foot of the chart.

Additionally, Excel 97 offers more chart types in versions for black and white printers as well as some fancy ones for screen display, slides, or colour printers. There are now bubble, pie of pie, and bar of pie charts, and there are pyramid, cone and cylinder shapes for 3D bar and column



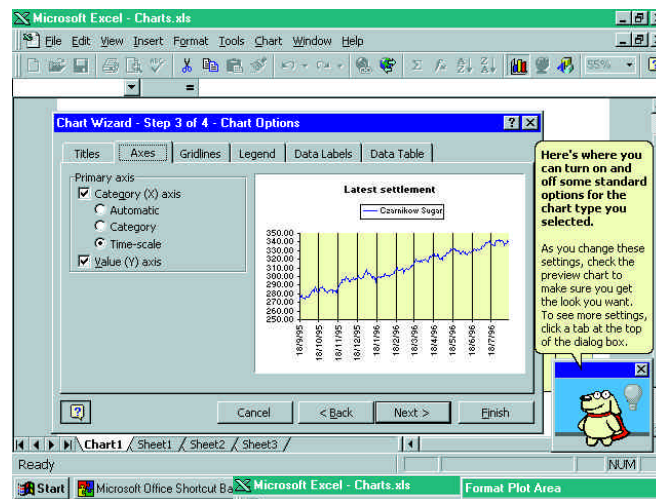
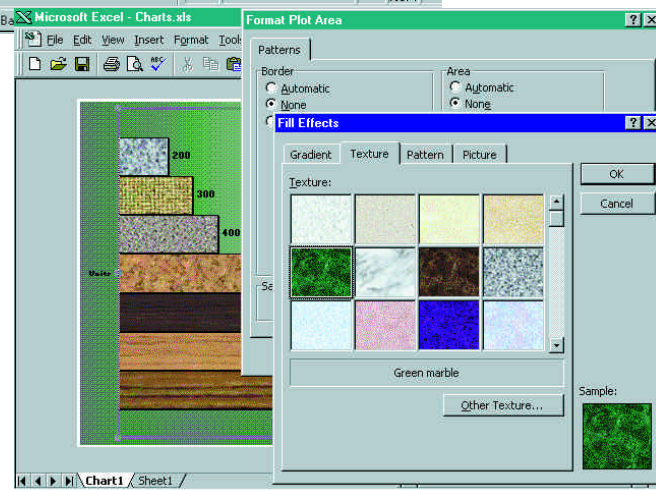


Fig 2 (left) The new Chart Wizard is so easy to use. A canine Office 97 Assistant can be an Excel-user's best friend

Fig 3 (below) Fancier charts for slides, colour printers or your web page. Your bars or background can now be wood, marble, or a picture

charts, as well.

The opportunities for designing custom charts are greatly expanded. If you want to have a green marble effect on the background, or a graduated mahogany effect on your bars, you can. Just choose the Fill Effects dialogue box (Fig 3).



Good intentions

Ever since Dan Bricklin and Bob Franckston designed the first spreadsheet for the Apple II, we have all become used to entering cell references. We might type in cell B5: =B3+B4. With Excel 97, Microsoft allows you to return to the terminology of the accountant's ledger sheet. If the labels in A3, A4 and A5 are Cash and Securities, Accounts Receivable and Quick Current Assets, then in B5 you can actually enter =Cash and Securities+Accounts Receivable. These are called natural-language formulas. No, Excel doesn't automatically create names here. It just lets you use row and column labels as references. This assumes that you've checked the "Accept labels in formulas" box under Tools, Options, Calculation.

The problem is you can't paste labels in to create a formula. You have to type them in, which can take forever. Personally, I create formulas just by typing an "equals" sign and then pointing to the cells to use.

I also found, in the beta version I tried, that this feature easily got confused. My worksheet included a list of ratios, one of which was named Current. I wanted to add

Net Plant & Equipment to Current Assets to produce Total Assets. When I tried to type in Current Assets, Excel used the Current result instead. The workaround was to lengthen the first label to Current Ratios.

Also, in columns headed with years, I could refer in a distant cell to Net Sales 1996. But if the column heading was a formula, like =B1-1, instead of 1995, then I received an error message even though the sheet displayed 1995. One solution here is to create the column headings with AutoFill. Select the first or last cell in the range you want to fill and enter the starting value for the series. If you hold down the right mouse button as you drag the fill handle over the range, to the right or left, you're offered a wide range of options on the shortcut menu.

Incidentally, if you've got Excel 2.1, 3.0, 4.0 or 5.0 worksheets that you want to try out under Excel 97, it will not only load them, but you can also save them again in the original format. These saved files won't include a lot of Excel 97 features but at least it means you can still run them with the more familiar version. Excel 97 will save in lots of other formats, too.

Some features in Excel 97 are there because they've been introduced to all

Office 97 applications. One of these is more animation. If you like Lotus SmartSuite's way of dropping down menus you can choose Tools, Customise, Slide. Alternatively, you can check Unfold and the menus swoop down and out to the right. No swooshing noises, though, as with Lotus.

Common Outlook

Another common Office 97 feature is that the Journal in Outlook can record your daily activity. If you wish, it will record when you first opened a workbook, subsequent activity and the total time you have spent on it. This has a number of uses. Some professionals will use it for billing time to clients. If you're looking for an Excel file that you know you worked on last Friday, go to that day in the Journal and there is a path to the file.

Some new features have been brought across from Word and extended. Excel's AutoCorrect for text has a lot of built-in corrections, for instance "annual" is automatically changed to "annual", and you can add your own frequent mistakes and replacements. The extension is that if you enter a formula incorrectly (forgetting a bracket, for instance) Excel will now offer to correct it for you. Another addition from Word is multiple levels of Undo, and there is also a drop-down list of recent actions so you can choose which to undo.

Some features are replacements. The Function Wizard (with the Fx button) has been superseded by the Formula Palette. Click the new = button. The box to the left, which normally shows the current cell reference or Names, now offers a drop-down list of functions. Click on one and a dialogue box appears which displays the name of the function, each of its arguments, a description of the function and each argument, the current result of the function, and the current result of the entire formula.

The new Fx button on the Standard toolbar works like Shift+F3 and is used for pasting functions.

There are new features for improving worksheet presentation. One is that you can run column heading labels at any angle. Another is that you can merge cells. You may not want to centre a heading across the whole worksheet but, say, across columns B through F in one row. You select the cells, then right-click and choose Format cells, Alignment, Merge Cells and this group of cells is treated as one. Yet another new feature is easier printing. On

the View menu, there is a new Page Break Preview command. I love this: it shows your whole sheet with the default printing page breaks; you can drag them where you want, so you can easily set the page breaks to logical places in your work; and if it's more important to you to get everything on one page, Excel 97 will automatically scale everything down to fit.

Some new features are things which just needed fixing. Before, if you gave a Pivot Table fancy formatting in Excel 7, for instance, you lost it when you rearranged the data to another view. But now your formatting is retained and you can include calculated fields as well. (Incidentally, although Microsoft is calling this Excel 97, the version number, under Properties, is Excel 8.)

Some existing functions have been supplemented with a new version. Included in its calculations are cells which contain text or the values TRUE and FALSE. These include MINA, MAXA, VARA and VARPA. I've never been one for overly-large

Fig 4 If you have room, Office 97 offers Web Query forms which enable you to quickly download data from the internet to your Excel 97 worksheet

single worksheets but Microsoft says a lot of its customers want them bigger than ever; so Excel 97 increases the maximum number of rows from 16,384 to 65,536. This will be good news for Excel database users, of course.

A feature which I expect to use a lot is data validation. You can easily specify the type of data allowed in a cell and have a custom message displayed if a user tries to enter anything else. You could restrict the entry to a date, for instance, or a number below a certain amount. The Auditing toolbar has an additional helpful Circle Invalid Data button, too, which helps you find invalid data.

On the web

The most dramatic changes to Excel in this new version

are the ways you can link beyond your own workbooks. You can create hyperlinks which jump to other Office files on your system, your network, your organisation's intranet or the internet.

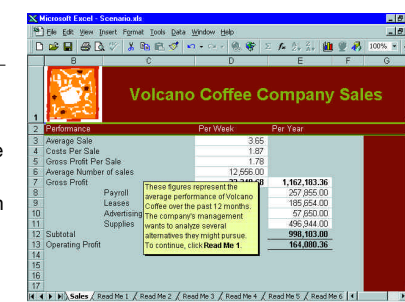
Excel 97 offers so many features in this area that I'll expand on them in next month's column, but here's one example. You can easily run queries to retrieve data available on the web. Microsoft Office 97 provides several sample Web Queries that you can run. I was amazed at how easy it is to access this information. I put the cursor on a new worksheet and clicked successively: Data, Get External Data and Run Web Query. This presented four pre-written Web Query files which are included with Office 97. I chose "Dow Jones Stocks by PC Quote, Inc".

One more click on the Connect button in Internet Explorer, which starts in the background automatically, then my worksheet was loaded with ten columns of data about each of the Dow Jones industrial stocks (see Fig 4; prices are current except for a legally-required 20-minute delay behind the New York stock exchange, US Eastern time). The Query form even has AutoFilter set, so that you can drop down an alternative list of transportation or utilities stocks; or you could filter out all but the top ten in terms of sales volume or Net Change for the day. When Microsoft localises this feature, we'll be able to access London's FTSE 100 just as easily.

Scenario Manager on CD

Scenario Manager is a powerful Excel tool for analysing complicated problems. A Scenario is a named combination of up to 34 variable cells. The built-in tool enables you to consolidate multiple "what-if?" models in one spreadsheet, and switch between the Scenarios to see the impact of various assumptions on your model.

On this month's cover-mounted CD, go to Software, Hands On, Spreadsheets, and you'll find Scenario.exe. Copy it to a disk, then open Excel (v5 or higher) and minimise it. In File Manager or Explorer, double-click on Scenario.exe. It will maximise Excel and offer an interactive demonstration of Excel's built-in Scenario Manager. The example provided is for the owner of a small coffee shop who wants to analyse various business scenarios.



EXCELlent shortcuts in Excel 97

- If you double-click a cell which contains a formula, any cell references in the formula change to different colours. The cells referred to are highlighted on the worksheet in those same colours. This new feature is called the Range Finder. To include more or fewer cells in a range reference, use the drag-handle in the lower-right corner of the border to select more or fewer cells. The formula will change correspondingly. (If you can't make a cell active for editing by double-clicking on it, choose Tools, Options, Edit tab and select the first Settings check box, "Edit directly in cell".)
- If you double-click the border of a selected cell, you can move automatically to the corresponding edge of a block of data. Click the top of the cell to go to the top of the block and so on. This is similar to Ctrl + arrow key.
- It's easy to list all your Outlook or Schedule + contacts on a worksheet. Open Outlook. Choose File, Import and Export, and click Export. In the Import Export Wizard, select the Contacts folder and the file type MS Excel. Name a new workbook, or browse existing workbooks and add a worksheet to one of them. You can either map the fields between the Outlook list and worksheet columns yourself, or the Wizard will do it.
- You can create hyperlinks without using your modem. Choose any cell on your worksheet. Click on the Insert Hyperlink button on the Standard toolbar and then browse for a file. This will make a link to that file. The default display in the cell is the file name but you can change it to something else or use a picture instead. The file might be a text scrap on your Desktop, or in any Office application.

PCW Contact
 Stephen Wells welcomes input on all spreadsheet matters. Write to him at PCW, or email spreadsheets@pcw.vnu.co.uk



Animal magic

Mark Whitehorn casts a beady eye over hierarchy in the zoo and shows a way of handling categorisation data. In addition, he passes on some improved solutions to past problems.

A reader called Andrew writes: "First of all, may I say how much I have enjoyed your column in *PCW*" (*ah, I love flattery — MW*). "But unfortunately it has got me thinking about a problem which I have never satisfactorily resolved for myself." (*Sounds like work! — MW*). "It involves a recursive link field in a table:

Field	Name	Type	Description
1	Code	Inc	Primary Key
2	Parent	LongInt	Parents Key
3	Category	String	Category Title

"The idea is to provide a hierarchy by using the table to emulate a tree structure which could be used for categorising animals, or departments in an organisation.

"I have been searching for an efficient way of finding all the categories that are below the current item. My best effort has been to run a query that finds all records whose parent is current code, add these to a result table and then query the answer to find all the records where there is a match on any of the codes. I keep this going until there are no records returned (when I've reached the bottom of the tree). Although this works, it does not seem very efficient. Do you have any ideas?"

What I have done is to look at ways of handling data from a table like the one Andrew describes.

Fig 1 shows such a table. It describes a hierarchy which is used to name the animals in a zoo.

Each record simply represents a single link in the structure, so the data is stored in a reasonably economical manner. However, you

need to look at several records to trace back up the structure.

So, for example, record 12 tells us that Harry's parent record is number three, which in turn tells us that Harry is a King. This in turn leads us to record two, and hence to record one, by which time we know that Harry is a King Penguin, which is a species of bird. The storage is economical, but a little unwieldy.

Fig 2 illustrates the information in a more legible state, and **Fig 3** shows the query. Note that the answer table is not showing one record for each record in the base table. This is because it takes several records to define one "branch" of the tree. The SQL is a little tortuous, but essentially it

is merely an expanded version of this:

```
SELECT DISTINCTROW Animal s. Category AS First, Animal s_1. Category AS Second
FROM Animal s AS Animal s_1
RIGHT JOIN Animal s ON
Animal s_1. Parent = Animal s. Code
WHERE ((Animal s. Parent=0))
ORDER BY Animal s. Category,
Animal s_1. Category;
```

which works for two levels of hierarchy.

This naming hierarchy is a little anarchistic in that names can appear at several levels. Suppose we have a more defined structure which must have, say, four levels. This will use the same base-table structure, but it provides a little more

Fig 1 Table of animals' names

Code	Parent	Category
1	0	Bird
2	1	Penguin
3	2	King
4	2	Baby Blue
5	1	Sparrow
6	1	Crow
7	3	Fred
8	4	Jim
9	6	Sally
10	4	Jenny
11	6	Fred
12	3	Harry
13	3	Brian
14	5	Spadger
15	1	Starling
16	15	Simon
17	15	Silvia
18	2	Humbolt
19	2	Rock Hopper
20	19	Rocky
21	0	Dog
22	21	Terrier
23	22	Border Terrier
24	23	Brown
25	24	Shaun
26	18	Barry

scope when it comes to defining forms. Two possibilities, one of which makes use of combo boxes, are shown in Fig 4, but neither is entirely satisfactory.

If anyone wants to try improving them, be my guest. The work so far is in the MDB file called DBCMAR97 on our CD-ROM.

Finally, it is possible to count those categories which exist under any given one, using a GROUP BY query based on the query (in this case called Project) which displays the data in the manner seen in the top right of Fig 4. So

```
SELECT DISTINCTROW Proj ect. Group,
Count(Proj ect. Pri ori ty) AS
CountOfPri ori ty
FROM Project
GROUP BY Project. Group
ORDER BY Count(Proj ect. Pri ori ty)
DESC;
```

produces the answer table for the data shown:

Group	CountOfPriority
Prototyping	4
Design	4
Repair	2
Year 2000	1
Modification	1
Consultancy	1

Rounding out

On to a little housekeeping. Over the past few months I've published several problems with solutions and asked for comments and/or improvements. This month, we'll tidy these up. Although most of the problems originate in Access, the solutions are usually applicable in most RDBMSs.

Last November I published an algorithm for rounding in Access. In last month's column I used several answers (of differing efficiency!) from readers. James Talbut came back with a modified version of his: "I'm probably too late, but anyway, I think I have fixed that rounding code:

```
Function Round(dNumber As Double,
iNumDigits As Integer) As Double
Dim dFactor As Double
Dim dTemp As Double
dFactor = 10 ^ iNumDigits
dTemp = dNumber * dFactor
If 2 * dTemp = Int(2 * dTemp) And
Int(dTemp) <> dTemp Then dTemp =
dTemp + dTemp / 2 /
Abs(dTemp) Round = (dTemp \ 1) /
dFactor
End Function
```

"The solution was simple. I just had to stare at it until my eyes ached. My fudge

factor was either 1 or -1, depending on the sign of dTemp. Unfortunately, this was compounding the way in which Access alternates between rounding up or down. The solution was simply to fudge by 0.5 or -0.5. It's still hideous, for something as simple as a rounding function. But as a technical exercise I think it's kind of neat. And it's probably still quicker than converting to and from a string."

I agree. It's ridiculous that we have to write something like this just to round a number. Why doesn't Access simply include a rounding function? Microsoft, please note for future versions.

1	2	3	4	5
Bird	Crow	Fred		
Bird	Crow	Sally		
Bird	Penguin	Baby Blue	Jenny	
Bird	Penguin	Baby Blue	Jim	
Bird	Penguin	Humbolt	Barry	
Bird	Penguin	King	Brian	
Bird	Penguin	King	Fred	
Bird	Penguin	King	Harry	
Bird	Penguin	Rock Hopper	Rocky	
Bird	Sparrow	Spadger		
Bird	Starling	Silvia		
Bird	Starling	Simon		
Dog	Terrier	Border Terrier	Brown	Shaun

Fig 2 The data is stored in a reasonably economical manner

Case-sensitive joins

In last December's edition of my column, I published an email from Andrzej Glowinski who bemoaned the lack of case-sensitive joins in Access. I published a solution but he found it too slow, so I asked for other ideas as well as solutions in other RDBMSs. I was impressed with the intriguing answers, reproduced here.

On the subject of case sensitivity and the lost ninth data type, Stephen Parry writes: "There is another solution to Andrzej's problem with case sensitivity in joins, indices and sorting. It does, however, rely on a partially documented feature of access, data type 9 (aka BINARY). The BINARY field data type has been in Access

since its earliest beginnings but has been omitted from key places in the package and its documentation throughout. Various system table fields use it and it appears as the data type for certain field types, in tables attached from other database products.

"It behaves much like TEXT in all respects except any comparison operations (joins, indexing, sorting) operate on ASCII code value, i.e. case sensitively. Very useful; but how do you create one? 'Not easily' is the answer to that. BINARY does not appear as an entry in the field type list in table design view. If you try to use DB_BINARY with the CreateField method in

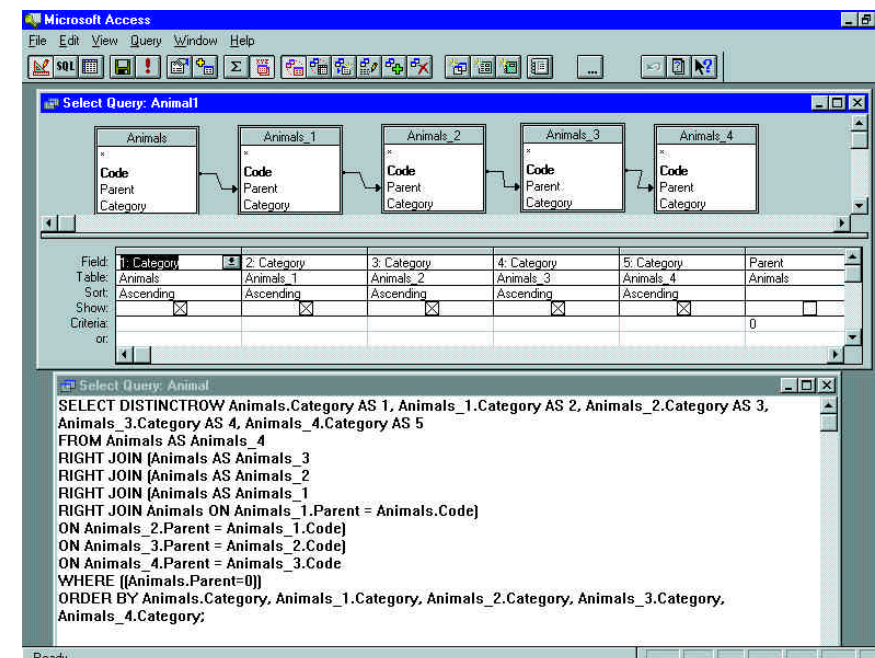


Fig 3 This SQL looks a bit complex, but it is just an expanded version of the code listing on p295

"To add a binary column to an existing table, I suspect an ALTER TABLE statement should work, although I have not tried it. This would allow you to add a new binary column to an existing table. You could then use code or query to copy the data from an existing column and then remove the original column. Thus, you have a long-winded means of changing a column's data type to binary.

"Of course, this all begs a fundamental question: why the (beep!) is something as useful as this so well hidden? I suspect that with sustained use, various 'holes' might be found in the functionality of this data type.

"Microsoft obviously intended a more complete but as yet unrealised solution to problems like this, but needed a quick solution to the Paradox and dBase connectivity problems, as well as a quick fix for some internals. For now, however, I will certainly continue to use it.

"By the way, I have noticed that in Access 7, nasty ol' Microsoft has encrypted its Wizards and other .MDA add-in files in this release. I have derived many useful programs from hacked versions of the Access 2.0 wizards, e.g. a database object directory comparison tool and a scripting tool based on the documentor, which just outputs a mammoth text file without generating a report or a temporary table. Hence, I was miffed to find that A7 has all its wizards compiled/encrypted in some way. Have you seen any way around this? I vaguely recall seeing an MSDN article on

securing add-in code and possibly one giving the unsecured contents of certain wizards, but I have not been able to find either again."

I knew of the binary data type but hadn't thought of it as a solution to this problem. As to decrypting the Access 7.0 wizards, has anyone else found a way?

On the subject of case sensitivity, the following came from Neil Howie: "A bell rang at the back of my mind, so I set about creating a similar query in Paradox 7 but taking advantage of the fact that if you have maintained secondary indexes, you can set a case-sensitive option.

"Adding an auto primary index to each table and setting up secondaries on the Names fields let me set up the join in the query window and display the required result with the greatest of ease.

"For further investigation I took a long doc, converted it to text and wrote a little routine to extract the words to create two files, 12,000 records long. I modified the second to capitalise the last letter of nine words out of ten at random, then pushed these into Paradox. Because of repetitions, it produced 15,000 matches in 18 seconds, so I guess on your enquirer's 200,000++ records it would still not be a practical proposition if he had to do it too often.

"However, what is now worrying me is that executing the same query in Delphi (using Paradox's SQL) takes almost 50 seconds. What am I doing wrong?"

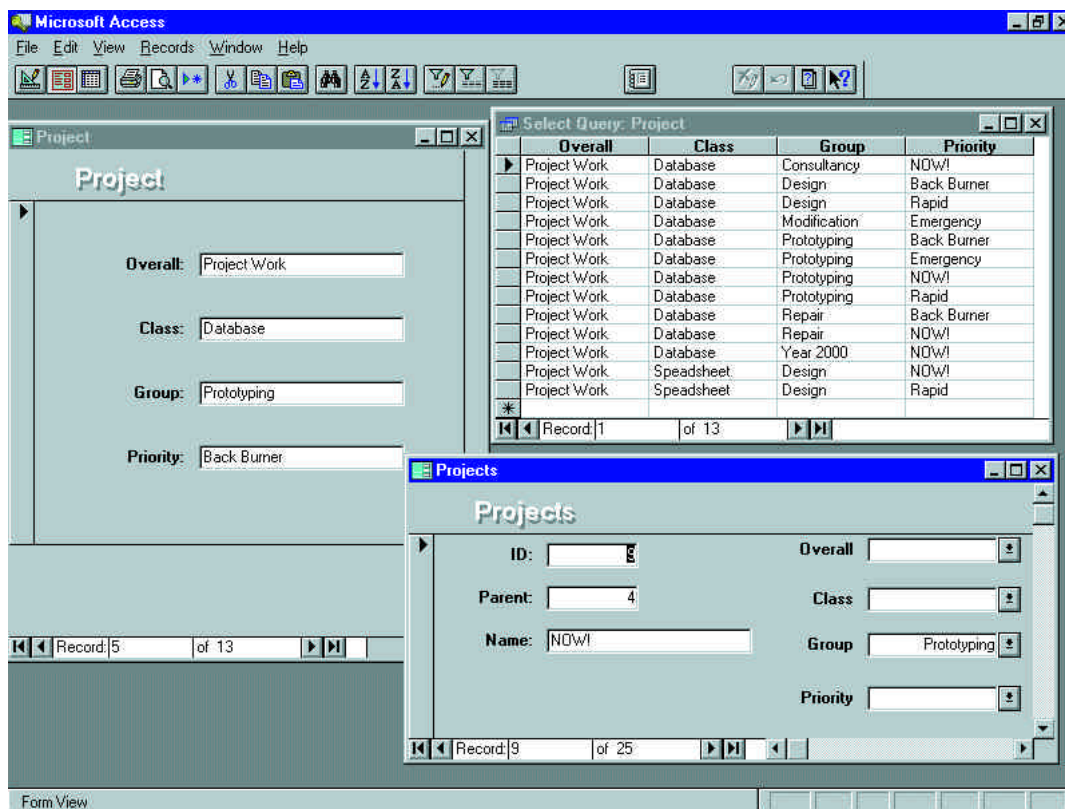


Fig 4 A defined structure with four levels provides more scope when defining forms

Making your mark

Last month I published a problem from Andy, a teacher who was using Access 2.0 to store his pupils' marks. He wanted not only to store the marks that his students achieved in their tests, but also their positions in the various class groups.

I suggested there was a conflict here between relational theory and expediency, and asked for suggestions and restraint (in the hope of avoiding a holy war). I am delighted to report that (nearly) everyone kept their heads and the majority of answers were helpful rather than religious. Paul Mapstone's answer (below) was the most complete. It is also applicable to any situation in which a rank order is required.

"My advice on this is not to store derived data (i.e. the Position column) unless you have to, for performance reasons. This is a good example. It is fairly straightforward to calculate the Position column in standard SQL using a correlated subquery as follows:

```
SELECT A. [Pupi l ID], A. [Test ID],
A. Score, A. Posi ti on,
(select Count(*) + 1
from [Test Scores] AS B
where B. [Test ID] = A. [Test ID]
and B. Score > A. Score ) AS Rank
FROM [Test Scores] AS A
WHERE A. Score is not null
ORDER BY Score DESC
```

"Column Rank in the above query should

correctly return the required Position. This works because the Position is equal to the number of people who have a better position + 1. Alternatively, you can use the SQL'92 outer join syntax (which Access seems to partially support) as follows:

```
SELECT A. [Pupi l ID], A. [Test ID],
A. Score, A. Posi ti on,
Count(B. Score) + 1 AS
Rank
FROM [Test Scores] AS A LEFT JOIN
[Test Scores] AS B
ON A. [Test ID] = B. [Test
ID] and A. Score < B. Score
WHERE A. Score is not null
GROUP BY A. [Pupi l ID], A. [Test
ID],
A. Score, A. Posi ti on
ORDER BY A. Score DESC
```

"We need the outer join, as the inner join will eliminate the top result. Either of the above queries could be used as the basis of any required reports etc, but if your teacher really wants to store the rank in the Position column (and suffer potential update anomalies), simply save one of the above queries with the name 'Rank query' and use it in the following UPDATE query:"

```
UPDATE [Test Scores]
SET Posi ti on = dlookup("Rank",
"Rank query",
"[Pupi l ID]" & [Pupi l ID] &
" and [Test ID]="
```

```
& [Test ID])
WHERE Score is not null;
```

An excellent answer. Paul's first paragraph touches on the heart of the conflict. Storing derivable data usually has no benefits and several major disadvantages (such as causing potential update anomalies). However, storing such data can occasionally yield a major performance benefit. Of course, a real purist would never consider mere performance as a justification for breaking one of the central tenets of the relational model. Non-purists, on the other hand, wouldn't even hesitate. I sit uncomfortably on the fence, sticking to the purist line whenever possible and worrying every time expediency forces me to break what I know to be a sensible rule.

Paul's solutions are on this month's cover-mounted CD-ROM as PAUL.MDB and PAUL95.MDB. The first is an Access 2.0 version which crashes Access every time I try to run the update query. There cannot be anything fundamentally wrong with the solution because the problem does not occur in Access 95. So perhaps it is my machine?

PCW Contact

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column at database@pcw.vnu.co.uk



Power points

Mike Mudge faces a stiff challenge in proving a solution, and this leads him to considering a number of related problems concerned with the power sums of separate digits.

I was asked (by Cyprian Stockford) for a proof that the only solution to

$$1^2 + 2^2 + \dots + n^2 = N^2$$

is $n = 24$ when $N = 70$, viz. positive integer solution of

$$n(n+1)(2n+1) = 6N$$

is unique as asserted in *The Penguin Book of Curious and Interesting Numbers* (David Wells, 1987) and elsewhere. Being unable to provide such a proof (can any readers help?) my attention was caught by a number of notionally related problems involving the power sums of the separate digits or the partitions of a given positive integer.

■ **1:** 1201 seems to be the smallest prime number which can be represented by the expression $x^2 + ny^2$ for all values of n from 1 to 10. Is this true? What other prime numbers can be so represented, and what happens if the range of values of n is increased to 1 to M for an arbitrary M ?

■ **2:** It is clear that $1233 = 12^2 + 33^2$ while $8833 = 88^2 + 33^2$. Under what circumstances is a given integer equal to the sums of the squares of its partitions into pairs? How does this result extend to the cases of higher powers (i.e. cubes) and also to the cases of partitions into ordered triples, 4-tuples, etc? Does this lead to a sensible problem in number bases other than 10?

■ **3:** $3435 = 3^3 + 4^4 + 3^3 + 5^5$ while it is said that (Wells, p.190) 438579088 is the only other number exhibiting this behaviour when powers of a single digit are considered. Can this result be generalised to pairs, i.e. $abcdef\dots = (ab)^{ab} + (cd)^{cd} + \dots$ or even to triples, etc? What happens in other number bases?

■ **4:** By inspection, $175 = 1^1 + 7^2 + 5^3$; when, in general, does

$$a_1^1 + a_2^2 + a_3^3 + \dots + a_n^n = a_1 a_2 \dots a_n$$

where the right-hand side is understood to

mean the integer so written in any number base? It is more natural to reverse the powers and even to start at zero, thus requiring

$$b_0^0 + b_1^1 + b_2^2 + \dots + b_n^n = b_n b_{n-1} \dots b_2 b_1 b_0$$

The Subfactorial Function is defined as

$$!N = N! (1 - 1/1! + 1/2! - 1/3! + 1/4! \dots (-1)^N / N!))$$

where

$$N! = 1 \cdot 2 \cdot 3 \dots N \text{ e.g. } !5 = 5! (1 - 1/1! + 1/2! - 1/3! + 1/4! - 1/5!) = 44$$

while $!7 = 1854$. It is stated that 148349 is the only number equal to the sum of the subfactorials of its digits.

■ **5:** Prove this result and attempt to generalise it to other number bases. Try replacing subfactorial by factorial and/or replacing sum by product. Comment on the function obtained from the subfactorial function by introducing only positive signs into the definition.

■ **6:** Regarding the individual digits of an integer: is it possible to get a prime number from any given number by changing one of its digits? The answer is "No". The smallest integer for which this is not possible is 200. Is it possible to get a prime number from any given integer by changing two of its digits? If not, what is the smallest number for which this is not possible?

Investigations of the above problems should be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St Clears, SA33 4AQ, by 1st June 1997. All material will be judged using suitable subjective criteria and a prize will be awarded to the best entry arriving by the closing date (SAE for return of entries).

Golomb Rules, OK (PCW, Aug '96)

This problem produced a large and varied response. In the problem P1 seeking a solution greater than 7 to $n! + 1 = N^2$, Alan

Cox extended Kraitchik's lower bound from 1020 to 2500 using MAPLE V release 4 on a Dell 486D DX33 with 8Mb RAM and about 250Mb hard disk, in about six hours.

Problem P2 is solved completely.

Dr John Cohen gave the reference to *Finkelstein & London* in *J. Number Th.* 2 (1970), pp 310-321, together with references to work on $y^2 + k = x^3$ for a large range of k by Josef Gebel. Nigel Backhouse obtained a list of Golomb Rulers up to order 15, the final length being 151 with an example (0, 4, 20, 30, 57, 59, 62, 76, 100, 111, 123, 136, 144, 145, 151).

Gareth Suggett indicates that a group from Duke University have obtained optimum rulers up to 19 marks (*New Algorithms for Golomb Rulers Derivation and Proof of the 19 Mark Ruler*, Dollas, Rankin & McCracken, Nov '95). Gareth speculated on the metric result for measuring all distances in centimetres from 1 to 100 on a metre rule. He refers to The *Dipole* column in *The IEE News* some years ago with the best known solution as 15 marks at 1, 2, 8, 14, 25, 36, 47, 58, 69, 80, 85, 90, 95, 98, 99. Is this minimal and/or unique?

Our prizewinner is RF Trindall, of Cambridge, for his extension to circular Golomb Rulers with $n(n-1) + 1$ points spaced round a circle uniformly and n of them marked to measure every distance from 1 to $n(n-1)$. This was accompanied by analysis of P2 and P3 and some (accepted) criticism of their difficulty... sorry, readers!

PCW Contact

Mike Mudge welcomes correspondence from readers on any subject within the areas of number theory and computational maths, together with suggested subject areas or specific problems for future articles. Email numbers@pcw.vnu.co.uk



Serial solution

Roger Gann shows you how to maximise comms speed by making the most of that unsung PC hero, the serial port. Plus, do *you* know the difference between baud rate and bps?

This month I'm taking a look at that unsung hero of the internet, the humble PC serial port — without it, where would modems be? I'll be showing you various ways to ensure you're squeezing every last drop of performance out of it, so that it doesn't bottleneck your modem and mar your surfing "experience".

The first port of call

The original PC serial interface used the 8250 (later 16450) Universal Asynchronous Receive/Transmit or UART chip. The 8250 UART has only a one-byte receive buffer, which means that after the 8250 receives a character, it has to be retrieved before the next character arrives or it's overwritten, i.e. lost. This leads to CRC errors, with consequent retransmissions and an inevitable impact on throughput.

At 1,200bps, a new character arrives about every 8ms — plenty of time for an interrupt handler to fetch the character from the UART and store it in a receive buffer. But at 19,200bps, a new character arrives about every 0.5ms, and at 115,200 baud (the maximum speed of the standard PC COM port) about every 90 microseconds. Depending on your CPU speed, there may not be enough time to reliably service one interrupt per character. As a result, the effective throughput ceiling of an 8250 UART is 38,400bps.

The superior 16550A or AFN UART overcomes many of the limitations of the 8250 and is reliable at speeds of up to 115,200bps. It has two main improvements over the 8250. Firstly, it has a pair of 16-byte send and receive buffers, thus giving it 16 times the buffering capacity of the 8250. Secondly, it has a First In, First Out (FIFO) buffering scheme, which can dramatically

improve performance on modem transfer speeds of 9,600bps or higher.

To see which UARTs are installed on your system, exit Windows and run the MSD utility included with DOS 5.0 and later by entering MSD at the DOS prompt. Once in the program, press C to see your COM ports. The type of UART installed for each of your ports appears on-screen.

Serial port upgrades

If you have an 8250 UART you have two choices: you can either upgrade to a 16550A or buy a third-party card, such as the Hayes ESP II. Note that if you have an internal card modem, it will most probably have its own 16550 UART aboard, so upgrading your PC's UARTs won't be necessary.

Upgrading 8250 UARTs

If you have a pretty old I/O card in your PC, the chances are it's got a 40-pin socketed 8250 UART. In this case, upgrading is simple. The 16550A is pin-compatible with the 8250, so all you've got to do is obtain a 16550AFN UART from somewhere like Maplins or Radio Spares, unplug the 8250 and replace it with the 16550A. However, if the 8250 is soldered in or you've got a more modern I/O card with a multi-function ASIC chip, then it's much less hassle to buy a £20 replacement I/O card.

Hayes ESP

Hayes Optima V.34 modems use a bigger "data dictionary" than their rivals and this enables V.42bis data compression to achieve 8:1 compression ratios, twice as much as normal. On a 28.8Kbps modem this would give you a maximum potential data transfer rate of 230Kbps, way beyond

the capabilities of a "fast" 16550 serial port. So Hayes offers its own serial-card solution, the Hayes ESP Communications Accelerator. This 16-bit ISA card is outwardly 16550-compatible but features a co-processor plus a pair of 1Kb send and receive buffers designed to eliminate buffer overflow problems. The ESP has had a spot of bother on the driver front over the years and the NT drivers have yet to emerge from interminable beta, but the Windows 95 drivers work just fine. The ESP II single port card goes for around £60 plus VAT. If you're serious about high-speed comms, this is the card to use.

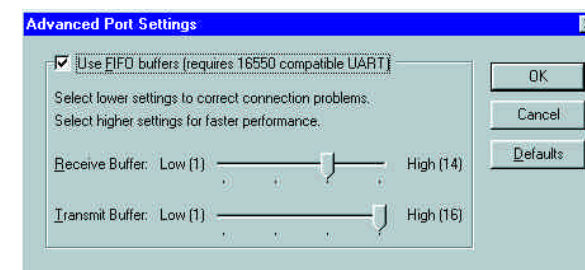
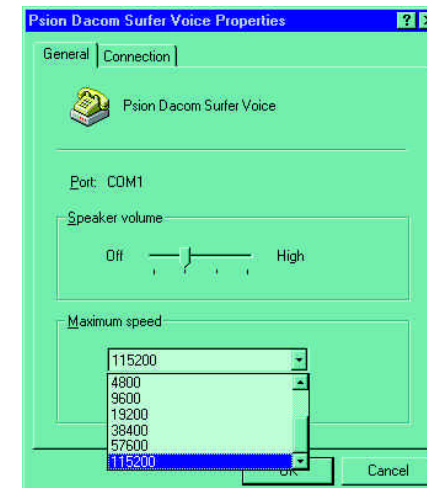
Software tweaks

As well as upgrading your serial port hardware, there are a number of software tweaks you can make to improve data throughput.

Flow control

With today's fast data transfer rates it's essential for the computer to be able to exercise some control over the flow of data to and from the modem, in order to prevent data loss. After all, there's no point in sending more data if the last lot hasn't been dealt with. This process is called flow control and there are several ways of doing it. The slowest way is software flow control, which makes use of two special characters, XON (Transmit on) and XOFF (Transmit off). When software flow control is in effect, sending a modem an XOFF character stops the flow of data. Sending the modem an XON character causes data to flow again. This is an inefficient method, significantly reducing bandwidth by adding two control characters for every eight sent.

The alternative is hardware flow control



Top Windows traditionally errs on the side of caution when it comes to modem line speeds, but it's normally quite safe to throw caution to the wind and crank it up to its maximum speed: 115,200bps in the case of V.34 modems

Above Once again, Windows errs on the side of caution when it comes to the FIFO buffers in the 16550 UART. Experiment by upping the Receive Buffer from 14 to 16

or RTS/CTS, which is more responsive and efficient. This uses a set of pins in the serial port, "Ready to Send" and "Clear to Send", and depending on their "state", data is either sent or paused. A minor caveat: you will need a decent, fully-wired serial cable with the CTS/RTS wires in place for hardware handshaking to work. Note that this type of flow control isn't the exclusive preserve of external modems — internal modems can also take advantage of it.

So how do you choose hardware flow control? In Windows 3.1x open Control Panel, then double-click on the Ports icon. The resulting window offers an icon for each COM port. Double-click on the icon of the port you want to configure, then click on the Settings button. Select Hardware from the Flow Control list box, and then click on OK. In Windows 95 click on the Modem applet in Control Panel, highlight your modem and click on the Properties button. Click on the Connection tab and then on the Advanced button. Check the "Use Flow Control" box

and select Hardware (RTS/CTS). Click OK a few times to back out.

You may also need to tell your comms apps to use hardware flow control. For example, if you use WinCIM 2.01, simply add the line

```
FlowControl = 3
```

to the [Connector (CIS Connection)] in the CIS.INI file.

You'll also need to tell your modem which type of flow control to use. Check through its "initialisation string" and see if you can see "&K3", the usual Hayes command for turning on hardware flow control. You'll need to do this for DOS and

Windows 3.1x comms apps; under Windows 95, provided you've installed the modem correctly, turning on the hardware flow control via the Control Panel modems applet is sufficient.

Windows 3.1x

Windows 3.1 was the first version of Windows to support the FIFO feature of the 16550 UART for Windows-based applications. (DOS apps running under Windows 3.1, 3.11, or Windows for Workgroups 3.1 don't support the FIFO feature.) However, Windows for Workgroups 3.11 does give DOS comm apps access to the FIFO feature. An upgrade for the Windows for Workgroups communications driver SERIAL.386 is available which can also use the transmit buffer (TX) of the 16550 UART. Previous versions of the communications driver use

the receive buffer (RX) only. Check the Microsoft KnowledgeBase on the web for WG1001.EXE, which contains the updated driver.

You may be able to improve throughput without the need for new hardware, simply by adjusting a couple of Windows SYSTEM.INI settings. Incoming data is held in an internal buffer by COMM.DRV, the Windows 3.1x serial port driver, until it's retrieved by the comms program you're using. However, it's not always possible for the comms program to retrieve this data in a timely manner. If the buffer isn't cleared, then data can get overwritten. Luckily, it's possible to adjust the size of the buffer. By default, this is set to 128 bytes.

By simply adding a line to the [386enh] section of your SYSTEM.INI file, you can create a buffer as large as 10,000 characters. Actually, since the COMM driver maintains a separate buffer for each of your PC's COM ports, you can add up to four lines, each controlling the size of a particular port's buffer.

The syntax looks like this:

```
COMxBuffer=num
```

where x is the COM port number, i.e. a number between 1 and 4, and "num" the buffer size. Thus:

```
COM4Buffer=1024
```

sets the size of the buffer for COM 4 to 1,024 bytes. Don't forget that you've got to exit and restart Windows for the change to take effect.

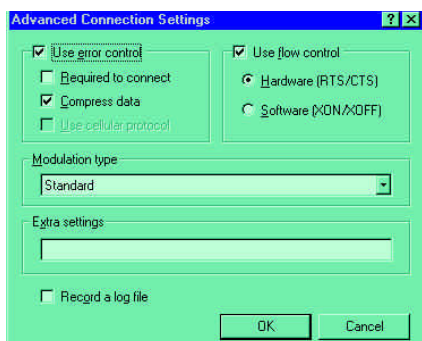
How big should your COMM buffer be? If characters are being dropped from incoming data transmissions, create a new buffer of at least 2,048 bytes. If problems

Universal Serial Bus (USB)

Luckily, in the nick of time, a solution to the inherent inadequacies of the serial port has arrived: the Universal Serial Bus (USB) which, by the end of the century, will probably replace both serial and parallel ports on PCs. With speeds of up to 12Mbits/sec, USB is aimed at simplifying and standardising the interconnection of PCs with peripherals such as modems, printers, mice, keyboards, digital speakers, joysticks, gamepads, telephones, telephone networks, scanners and digital cameras.

USB uses a tiny four-pin connector (two for data, one for power and one for ground). In fact, there are two types of connector: "Series A", a plug for a peripheral and a socket for a PC platform, is for applications permitting the cable to be moulded into its peripheral, while "Series B" is used for applications requiring a removable cable. The two-connector series is keyed differently to avoid mis-matching. PCs will most likely feature a USB "expansion hub" built into the keyboard or monitor, which will allow peripherals to be daisy-chained together — USB can connect up to 127 different devices to a single PC.

Instead of relying on the intelligence embedded in the host PC, the USB detects which devices are added or removed, automatically determines what host resources each peripheral needs, including driver software and bus bandwidth, and makes them available. Future versions of Windows 95 will be equipped with drivers that allow a PC to recognise USB peripherals. The plug-and-play feature enables users to attach or remove peripherals with the system running and without requiring the nuisance of rebooting. According to Dataquest, by the summer, 75 percent of the 22 million PCs manufactured worldwide will be equipped with USB ports.



If you want reliable, high-speed modem connections it's important to make sure you're using hardware rather than software handshaking; use this dialog to choose which

persist, increase the size of the buffer to 4,096 or even 8,192 bytes. Note also that the 16550A by default wakes up in 8250 mode and has to be switched in to 16550 mode via software. So if you've got a 16550 buffered serial port, you have to explicitly tell Windows 3.1x to use it. Add this line to the [386Enh] section of your SYSTEM.INI file:

```
COMnFIFO=0n
```

where n represents the number of the COM port for which you are activating the buffer.

Another tweakable parameter is the COMBoostTime. This SYSTEM.INI entry specifies the time allowed a "virtual machine" to process a COM interrupt: if it's too short, you can lose characters. Its default value is 2 but you could try increasing it to 4. Once again, it's located in the [386enh] section:

```
COMBoostTime=4
```

Rant corner — baud and bps

It's embarrassing, the number of otherwise knowledgeable people who use the terms baud rate and bits per second interchangeably. For example, the brand new CompuServe front-end, v3.0, continues to refer to "baud rate" when it really means bits per second. Baud actually refers to modulation rate: the number of times the line changes state every second. The difference between baud and bps is a result of the different forms of modulation used to encode digital data into analogue waveforms. At 300bps transmission rates, bps and baud happen to be the same; but above this speed, the 1:1 relationship ends. The maximum baud rate possible over normal phone lines is 2,400; the maximum bits per second rate is, at present, 33,600bps. So please stop using baud when you mean bits per second. Purleeze!

Note: If you don't find it here, just add it. You can specify an even higher value but be conservative, since setting it too high can actually slow down communications.

■ Windows 95

Mercifully, Windows 95 makes optimising your modem's data throughput considerably easier than Windows 3.1x. Provided the modem is installed correctly, then there are only a couple of things to check. You should have received an INF setup file with your modem, which correctly describes all the modem's features for Windows 95. But if it didn't come with one and your modem doesn't feature in Windows 95's list of modems, you can always install it as a generic "standard" modem. This is OK-ish but not optimal, and if at all possible I'd recommend paying a visit to your modem maker's web site to see if proper Windows 95 INF files are available for your modem, for download.

Once installed, open Control Panel and

click on the Modem applet. Highlight the modem and click the Properties button. On the General Tab set the maximum speed to four times that of your modem's speed: if you have a 28,800bps modem, set it to 115,200bps. Windows traditionally errs on the side of caution and always underrates the modem speed, typically setting the maximum speed to 57,600bps.

Next, click on the Connection tab and then on the Port Settings button. Make sure the Use FIFO buffers option is ticked and experiment by sliding the Receive buffer all the way up to 16. Click OK and then click on the Advanced button. Make sure the Use Error Control and Use Flow Control options are checked. Click OK several times to quit. And, er, that's it!

PCW Contact

Roger Gann can be contacted by post c/o PCW at the usual address, or via email at hardware@pcw.vnu.co.uk



All in the past

Or is it? Virtual heritage promises realistic experiences of Gettysburg, the Colosseum, Stonehenge, and Hitler's vision of a post-war Berlin. Benjamin Woolley steps back in time.

As I write, an event is already underway in the centre of London, carrying the intriguing title "Virtual Heritage 96". Virtual heritage? What could that possibly be?

To the snobbish, all "heritage" is virtual — a fake recreation of the past that panders to the public's poor knowledge of history. It's all about grand country houses opening up shops to sell tacky knick-knacks, sales executives dressing up as Roundheads, and theme-park rides through reconstructed peasant villages saturated with synthetic sewage smells. What could be less real, more virtual?

Stonehenge, for one. To demonstrate the power of its new generation of processors, Intel got together with English Heritage and, under the direction of Professor Robert Stone, the VR pioneer who now runs VR Solutions, created a VR version of Stonehenge that could be accessed over the internet using Superscape's Viscap browser, a proprietary client for viewing scenes generated using the company's VRT authoring software.

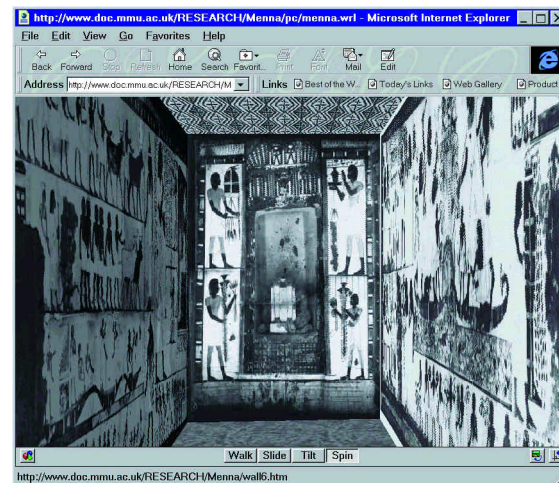
Thanks to the involvement of English Heritage (the quango that manages Stonehenge), the consortium was given access to the site and built up a precise database of its geometry. This database was then used to generate models that showed what the 'Henge would have looked like through the ages, from 10,500 years ago to the start of the next millennium. The result was a good demonstration of how VR (in the sense of real-time 3D graphics) can be used to recreate a lost past.

Although words like "photorealistic" were bandied about to describe the quality of the

model, nobody could possibly be fooled into thinking that the images of the Virtual Stonehenge you saw in the Viscap window were photographs. Nevertheless, it did give you the vaguest notion of what it might be like to be there without the distractions of coachloads of tourists and carloads of screaming children. It let you get inside the ring of stones, something we have not been allowed to do in actuality for years.

That, then, is an example of "virtual heritage". To quote Dr William Mitchell of Manchester Metropolitan University, a speaker at Virtual Heritage 96, it "...gives users the freedom to explore monuments that may no longer exist or may have been damaged or spoilt by the effects of tourism. Exploring virtual reconstructions leaves no footprints and can potentially allow a user to examine details that are just not possible to see physically."

Dr Mitchell has himself contributed to our virtual heritage with a project entitled "The Tomb of Menna", which formed the basis of his contribution to the Virtual Heritage 96 conference. Menna was an Egyptian scribe

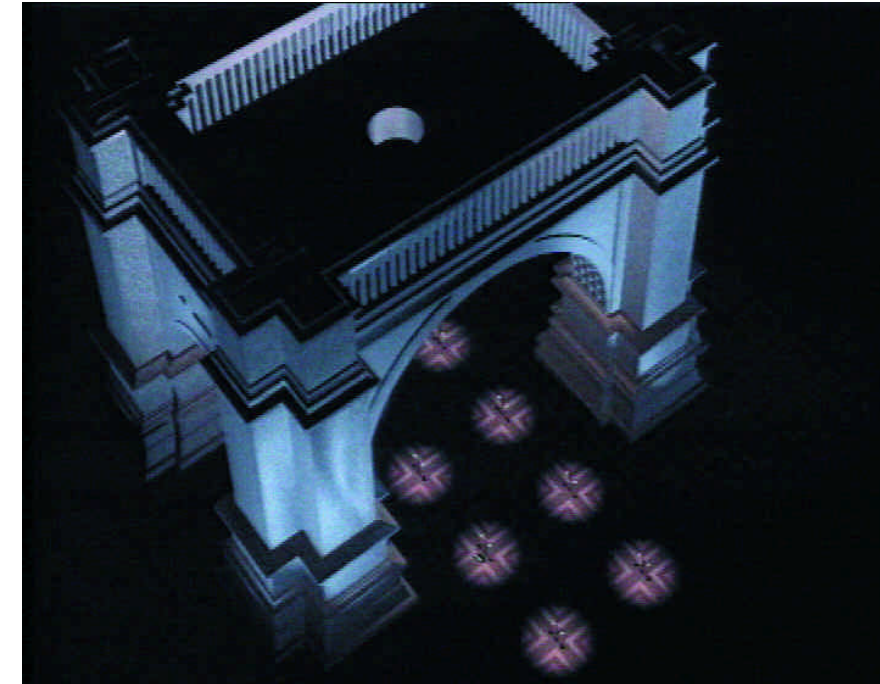


of the 18th Dynasty (whenever that was) and his tomb was discovered earlier this century in Thebes, the ancient city across the Nile from modern-day Luxor. Its recreation has been achieved using VRML, and pretty impressive it is too (Fig 1). The geometry is simple. The detail lies in the textures, which are highly compressed JPEG images of the friezes on the tomb's walls.

This is just one of an expanding array of projects that make up the virtual heritage movement. There's virtual Gettysburg, a virtual Chinese Terracotta Army and the virtual Colosseum. I myself was involved in realising a virtual Germania. Hitler planned to rename Berlin as Germania after he had defeated the allies. He even got his architect, Albert Speer, to draw up detailed plans, which featured on a TV programme about Berlin's history and future as a united Germany's capital. With the help of our friends at the modelling company, Modelbox, we used the plans to render up a series of animations. It was, I remember, an exciting process, since it allowed us to experience the impressive and oppressive scale of Speer's grandiose vision in a way Hitler himself never could (Fig 2).

It is possible that virtual heritage is a passing fad. The point of preserving Stonehenge is to provide a means of keeping in contact with something authentic in an increasingly artificial world. So to that extent it seems to be a contradiction in terms. It might also provide an excuse for

authorities such as English Heritage to deny access to monuments that are currently open to the public (tourist-free sites are, after all, a lot easier and cheaper to manage).



But as IBM, for instance, demonstrated in its reconstruction of Dresden's magnificent Frauenkirche, which was demolished by the Allied bombing raids in World War II, virtual heritage provides us all with a valuable way of recovering what we can no longer experience.

The virtual universe's Big Bang

The technologies being developed for building shared spaces or multi-user virtual worlds or whatever you choose to call them are now emerging thick and fast. I am pleased to report that everyone is being extremely co-operative in this enterprise, even now that we have a new contender on the scene: Open Community, from the Mitsubishi Electric Research Laboratory (MERL) in Cambridge, Massachusetts (formerly known as Universal Worlds).

Open Community (www.merl.com/opencom/opencom.htm) does not come from the VRML community (although it will support worlds built using VRML models). Rather, it has its origins in a technology developed internally by MERL called SPLINE (Scalable Platform for Large Interactive Networked Environments). SPLINE has been under development for more than three years. Using it, a virtual world has already been built: Diamond Park, a place "where avatars could travel around a large park, talk to others using

proximity-based voice chat, ride bicycles in a velodrome, create new world views, and play multi-user games".

To create Open Community, SPLINE has been combined with the Universal Avatar initiative (www.chaco.com/community/avatar.html) which aims to provide a standard for avatars so a virtual identity you create for one shared space on the internet could be used in another. The result is a sophisticated-looking application program interface (yes, yet another API) based on Java (yes, yet more Java) that embraces both the network and content sides of social spaces.

It is the fact that Open Community deals with the network side of the social spaces issue which, in my opinion, makes it particularly important because it is the network that makes social spaces unique, and presents the biggest challenge to making them work. The main problem is "latency". As we all know, you don't always get what you want from the internet when you want it. Data floods down the line one minute and dribbles down it the next. The reason for this is that the TCP/IP protocols, on which the internet depends, were not designed to deliver data in real time. They were designed to route things like email, files and scientific data which, generally speaking, one can afford to receive a minute or two later than expected.

For real-time applications, though, latency is a killer and shared spaces are, by their nature, real time. So Open Community promises to provide a set of tools which will

Fig 2 The Great Triumphal Arch of Speer's Berlin at night. This is a video grab, courtesy of Modelbox, hence the slightly fuzzy quality. It comes from the film we made recreating Speer's vision for Hitler's dream city. To give a sense of the arch's size, we inserted footage of a real car driving beneath it. At this scale it is a mere speck, barely visible at all, caught in one of the pools of street light illuminating the ground

manage this problem. A variety of techniques are suggested, ranging from the obvious (supplying the bulk of the data for a world on CD-ROM) to the ingenious. An example of the latter, given by the authors, is a simulated baseball game. When the batsman hits the ball, and a fielder runs to catch it, the batsman's "client" (the program running on the computer owned by the person controlling the batsman) anticipates where the ball will land, and passes on that information to the fielder's client before the ball has actually been hit. So the fielder's client can show the ball's initial direction even if the information about its actual trajectory is delayed by the network.

As we continue through 1997, I think the collaborative spirit in which Open Community and other initiatives are being discussed means there is a good chance of the industry doing justice to this most significant and exciting of 3D graphics/virtual reality applications. It is nice to start the year on such a positive note.

Render unto Criterion...

In the December issue column, I wrote about the Direct3D and QuickDraw 3D APIs. Who, I and many others were asking, will lead: Microsoft? Apple? Well, as I should have mentioned, for the time being neither will because the real leader is probably Criterion, the British company responsible for the RenderWare API. Criterion, now owned by Canon, claims RenderWare is the market leader. It is certainly popular, and is used in many games and VRML browsers such as Netscape's Live3D and SGI's Cosmo Player. It is fast, too (unlike Direct3D version 2, according to recent reports); you can see for yourself by trying out World Inc's AlphaWorld (www.worlds.net).

PCW Contact

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Signing off

The price of fame — Gordon Laing is fed up with signing his name. Whether it's autograph hunters or correspondence overkill, here's how your computer can do the signature for you.

It may be the month of St. Valentine when you read this, but as I write, we're one week away from Christmas Day. I designed my own card for the season of goodwill, but as I laboriously hand-signed every one, it occurred to me that there must be an easier way of doing it. The signing bit, that is.

Although I feel that using a good old-fashioned pen lends a personal air and wouldn't change it for a thing, there are many occasions when having your signature, or other sample of essential handwriting, on call from your PC could be extremely handy.

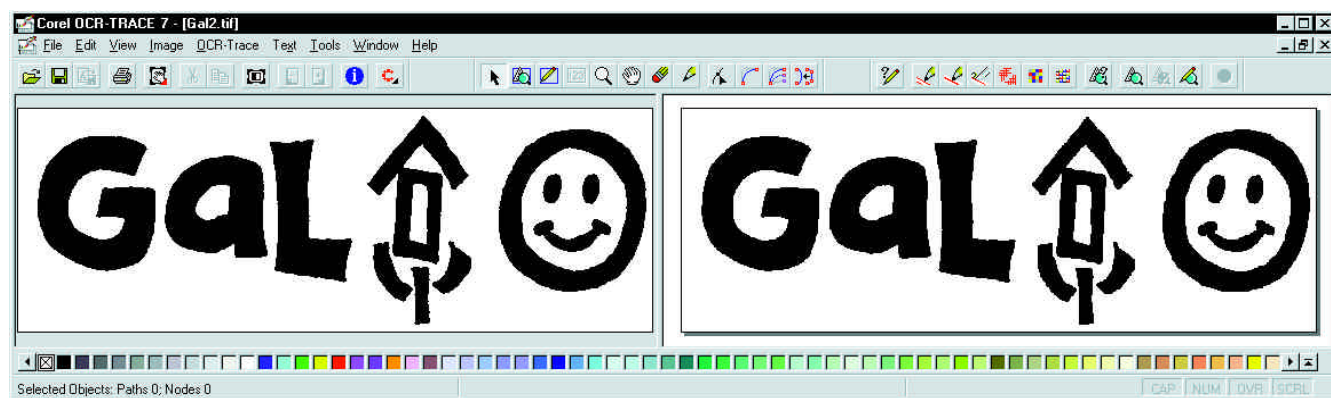
Written and carefully formatted a letter? How many times have you printed it out, stuck it straight into the post and watched it speed away without signing it? What if you're faxing from your PC and want to personalise your memo, without wasting paper at your end? Editor of a leading magazine perhaps? How do these people get their signatures into Quark XPress and consequently in the front of the magazine? Alternatively, you could simply be far too busy or important to do something as banal as signing letters with a pen.

So how else can you do it? The obvious technique is to sign a piece of paper, scan it, and insert the bitmap directly into Word (or whatever else you are using). And that's it — pass Go, collect £200 (for the upgrade to your favourite graphics app) and turn to the next *Hands On* column.

Hang on a minute, though: if it were that simple and effective, this really would be the shortest and, some people may say, the best edition of the *Graphics & DTP* column so far! Fortunately for me, and you of course, there are considerably more twisted means of using scanned handwriting than just plain bitmap-plonking.

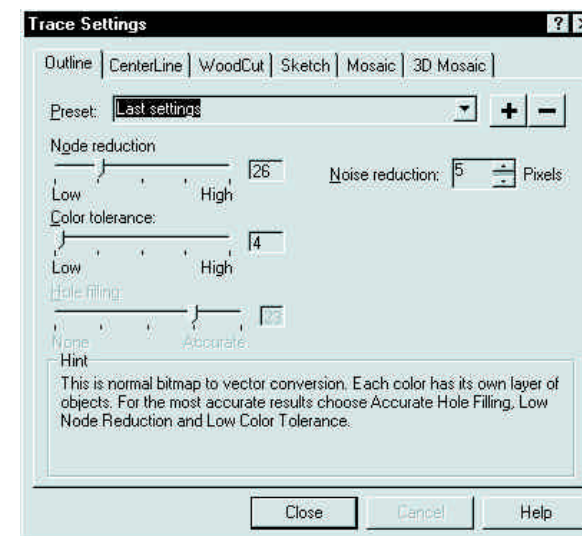
So you've got a logo or signature and want to use it on your computer? The first step is to scan it and produce a bitmap image. The GAL image is one I designed when I was only eight years old!

Top right is an enlargement of the smiley face bitmap, scanned at 100dpi — notice the low resolution. But with the aid of CorelTrace (below) I turned it into a smooth, scalable EPS vector file (right). Bitmap tracing requires a bit of trial and error, playing around with the settings (opposite page, top)



Just sign here...

As regular readers of this column will know, a bitmap is simply a grid of dots which can be coloured, or not. The more dots you have in the same distance (usually measured per inch) the greater the detail that can be captured. The downside is that more dots means bigger files, and as anyone tinkering with large colour scans soon discovers, bitmaps can quickly become unfeasibly large.



Scans of signatures should be in black and white

(See main caption, opposite)

(one bit per pixel) or greyscale (eight bits per pixel), as compared to full-colour 24 bits per pixel, and are usually physically small. A typical signature may measure three inches wide by one inch tall which, at 300dpi, results in 33Kb in 1-bit or 270Kb in 8-bit — hardly a huge file out of control.

But before you breathe a sigh of relief, even at a small physical size bitmaps have their disadvantages. In the first place, as soon as you start enlarging them, their undesirable blocky nature becomes visible. You could of course rescan at a higher resolution, but that's when the file sizes begin to grow. So bitmaps have an inherent lack of scalability.

Secondly, you've got to be careful when scanning in greyscale that the background you thought was white doesn't turn out to be a slightly dirty grey when printed with your otherwise pristine document. It's no good having a little grey box surrounding your signature or bits of dirt; in fact, this sort of mistake will end up making you look a lot worse than having forgotten to tag the signature on in the first place.

My advice is to clean up the marks, select the background greys with a magic wand style tool, and replace them with pure white just to make sure. I would even go for anti-aliasing to ensure that the edges are smooth. And you could play completely safe by converting to 1-bit line-art mode, or scanning in this mode to start with, but the results are often hard and jagged. Scanning in greyscale will pick up the nuances where the pen hasn't been pressed as hard, and indeed, the edges of the line itself. Although this may sound rather excessive, you really do notice the difference.

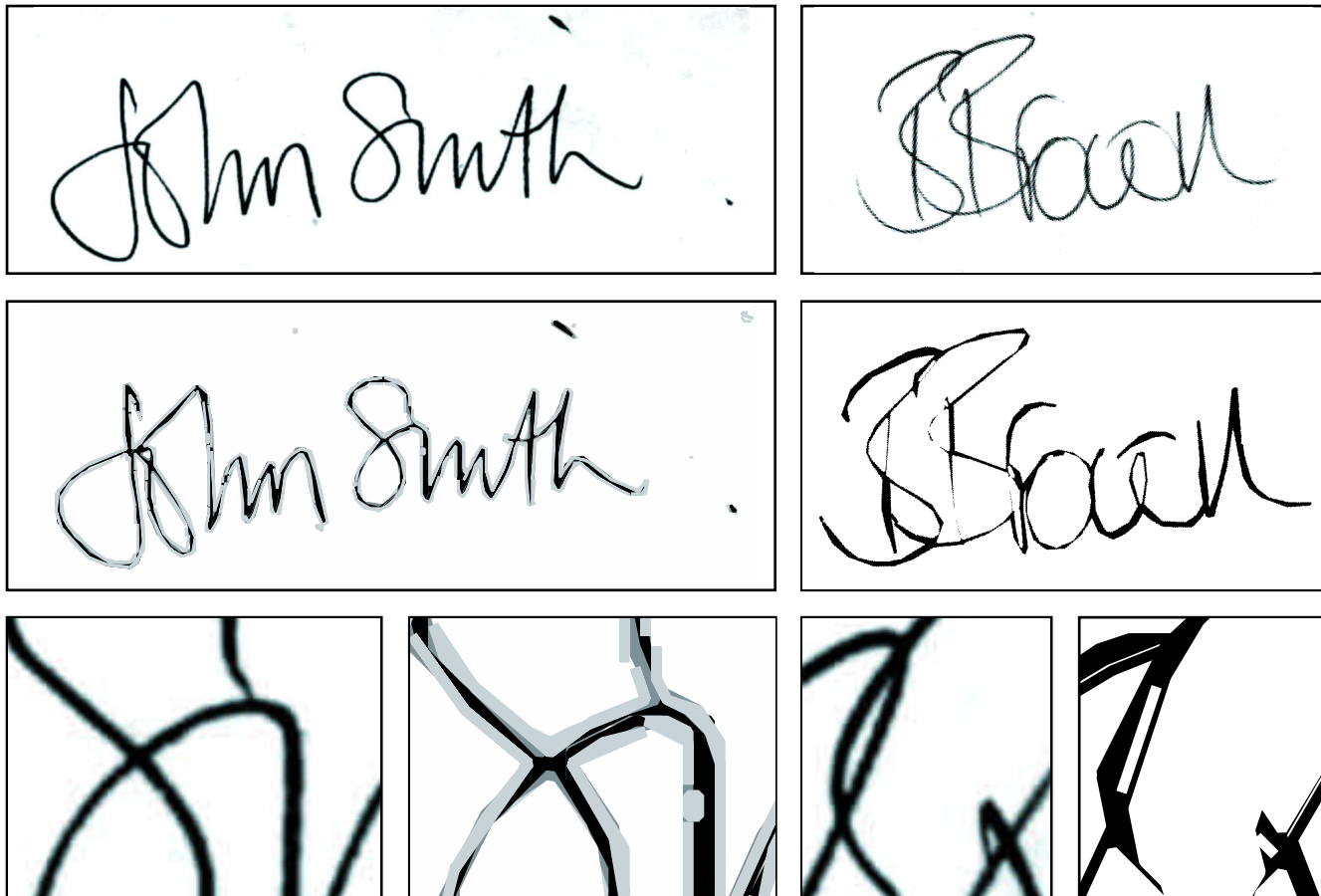
If you want to scale your signature, you'll need to convert your bitmap into a vector file format such as an EPS, using what is known as a bitmap tracer. Most drawing applications come either with this facility built-in or included as an optional utility. Corel's has its CorelTrace utility, now featuring substantial OCR facilities, FreeHand's tracing is built-in, while Adobe offers the standalone and very capable Streamline, although, unsurprisingly, the Windows version is ancient.

Bitmap tracing does just what you would expect from its name. Following user-defined preferences, the application traces the edges of the bitmap, creating an outline using vector bezier curves; just like drawing directly within CorelDraw or FreeHand. The resulting shape is scalable, very small in file size and should, with any luck, closely resemble the original bitmap image.

Tracing works best with very simple images made up of basic lines and curves, such as handwriting and logos. You'll need to play around with the preferences and tolerances before you get what you're looking for, but the final result is often worth it; you may even come across some unexpected gems in the process. Bitmap tracing is particularly useful with printed logos where a small file, which is scalable and device-independent, is very handy.

Font formulation

So you've tried using a bitmap, or even a traced EPS, but you're still having to draw separate picture frames or insert them as graphic objects. One alternative is to create your own font, made up of logos, handwritten characters, or even a whole



Just sign here: two typical signatures get the computer treatment. **Top left and right** are the original scans made at 300dpi in 8-bit greyscale; notice some dirt and marks in the background. **Middle left and right** are the traced EPSs, although the John Smith has been made with three levels of grey, resulting in a less severe outline than the single-level B.Brown. The resolution of the bitmaps along with the smoothness of the outline traces is shown in the four images immediately above, all enlarged five times. **From left to right:** John Smith bitmap (410Kb), John Smith three-shade EPS (110Kb), B.Brown bitmap (487Kb), and B.Brown single shade EPS (59Kb). You may never have to pick up that pen again!

collection of signatures — imagine having your entire company's signatures stored in a single font file, where pressing "A" could be the accountant, "B" could be the boss and so on.

To do this properly, you really need a dedicated application like Macromedia Fontographer, which comes as part of the FreeHand 7 Graphics suite. Here you can carefully create and tweak each character before mapping them to a character set and exporting as TrueType or Type-1. In fact, Fontographer features built-in bitmap tracing and encourages users to scan their own hand-drawn samples, which are converted into a scalable format; after all, TrueType and Type-1 font formats do use scalable vector descriptions.

CorelDraw boasts an intriguing export to TTF (TrueType font) filter (which I will be looking at in greater detail in a future *Graphics & DTP* column). If any of you have had experience of this, please let me know how you fared.

In the meantime, good luck, have fun,

but don't sign anything before you've carefully read the terms and conditions above — and do make sure that no-one gets hold of your precious signing rights and abuses them!

Digital cameras reveal all

Last month's digital camera group test was very revealing, particularly in terms of output in high-quality print. Manufacturers were concerned about us printing sample images from all the cameras, side by side: how could a budget camera compete with one costing ten times that amount, they argued?

A fair point, but in fact almost all models, including those operating at 640 x 480 pixels, looked fine reproduced at 50 x 75mm (approx). This shows how flexible these cheaper cameras can be, effectively operating at 240dpi when reproducing at two inches wide. Of course, had we printed them all at A4, only the expensive Nikon, Minolta and Polaroids would have weathered the test. But a good show for

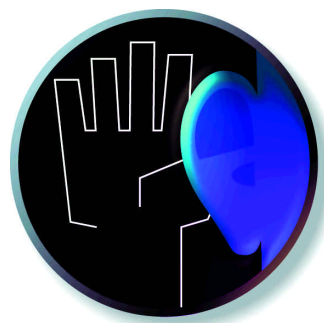
the entry-level nonetheless. I can't wait to get my hands on the forthcoming models I saw at Comdex. If any of you have any digital camera stories or experiences, I'd love to hear about them.

This month's PC group test features the latest Intel chips with MMX technology [*page 166*]. Faster multimedia performance all-round for those applications making the right calls. The good news, in theory, for graphics users is that Photoshop 4 and CorelDraw 7 are both already supposedly accelerated for MMX hardware. This column was written before our test results were available, so refer to that feature for the latest figures.

Next month I'll return to the subject of image manipulation, particularly the enhancement of photographs.

PCW Contact

Duff DTP? I recommend you contact the manufacturer. But if you know of any decent parties, please contact **Gordon Laing** at the VNU address or email graphics@pcw.vnu.co.uk



Tricks for kicks

Steven Helstrip stays on the beat with the second part of his drum workshop, examining the possibilities for kick drum patterns and providing advice on working with drum loops.

Following on from last month's Sound column, let's look further into the subject of drum production. Last month I focused on producing rhythm tracks, gave tips on how to make kick drums *really* kick, and ways to program interesting hi-hat patterns.

Following the pattern

Having looked at techniques for beefing-up kick drums, let's explore the possibilities for kick drum patterns.

The corresponding MIDI files have been provided on this month's cover-mounted CD-ROM in the sound/midi folder. The MIDI file for Fig 1 is named "fig1.mid" and so on.

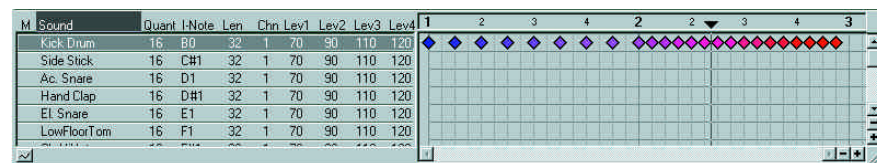


Fig 1 (above) Introduce semi-quavers in the penultimate bar

Fig 2 (right) Demi semi-quavers are introduced for greater intensity

The files can be imported, via the File menu, into any sequencer and edited further.

As a general rule, the kick drum's job is to establish the tempo of the track by

playing predominantly on the beat. Too much activity in the kick quarters can clutter up the bottom end, leaving little room for the bass to breathe. However, there are times when the kick can be used more creatively, most often to introduce a new musical phrase or section. Depending on the length and structure you are working to, this usually occurs at the end of an 8-, 16-, or 32-bar phrase.

It can also be effective to have an "event" to introduce the kick just before it comes in for the first time. For example, two bars before the kick comes in, try a pattern that fades in playing quavers, then introduce semi-quavers on the penultimate bar (Fig 1). This pattern is quite basic but, with a little imagination, can be developed. Depending on the style of track, you may want to use more, or fewer, notes.

Fig 2 shows a similar pattern, but this creates greater intensity because demi semi-quavers (or 32nd notes) are introduced on beat four of the second bar. There is also an accent on the beat throughout the second bar, which is shown more clearly in the piano role editor.

Experiment with these examples using a piano role-style editor by changing note velocities. For instance, try accenting the

Creative Essentials — House & Garage Construction

You rarely get change from £60 for a sampling CD, and not even at this high price can you guarantee high standards. So I was more than surprised when I listened to this new, budget, mixed-mode CD and found it to be right up there with the best as far as quality and consistency are concerned.



There are over 200 solid breaks, synth loops, stabs and basses in audio, .aif and .wav format, grouped by tempo from 120-160bpm. This CD is well-suited to those who work with audio-equipped sequencers, as many drum loops have been recorded in stages. For example: part one of a loop might consist of kick, closed hats and tambourine; part two introduces open hat, then snare.

The bass loops and arpeggios are well-produced and wouldn't sound out of place on today's dance floors. You also get multi-sampled pianos, organs and strings thrown in, plus 14 vocal samples.

For £20, this is truly one of the best value-for-money CDs I have come across. You can find seven samples from House & Garage Construction on this month's cover-mounted CD, in our Sound/samples folder.

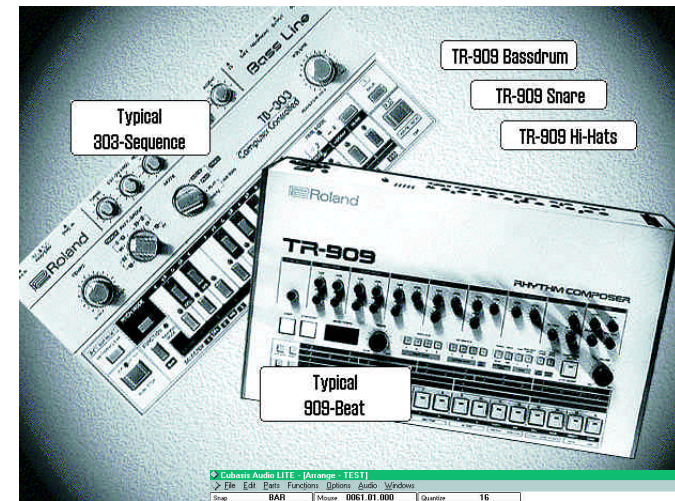


Fig 3 (left) Listen to the two most sought-after pieces of kit in the Dance Workshop: the TB303 and the TR909

Fig 4 (below) Cubasis Audio Lite's got 32 tracks and plenty of gizmos for easy sequencing

offbeat, moving or deleting notes. It is also worth experimenting with semi-quaver triplets, 16T.

The examples provided so far are only effective if used twice, or four times at the most, throughout the track. But variations can be used subtly at 16-bar intervals.

The "Fig3.mid" file (not shown here because our pages aren't wide enough) plays a 32-bar pattern, with a two-bar lead-in. At the end of each 16-bar section there is an event, or fill. Additionally, each eight-bar section is introduced with an extra note on the offbeat of beat four. This MIDI file could be used as a rough template for the kick track when starting a new song.

Getting your kicks

■ When using a kick drum on its own MIDI channel, it is possible to use pitch bend to create a glissando effect when knocking out 16- or 32-note rhythms. Experiment with different pitch bend ranges to achieve various effects.

■ If you have an effects unit, try recording a single kick (at original pitch) with a heavy reverb. This can be used on beat number one of a 16- or 32-bar section in order to add impact.

If you do not have an effects unit, don't worry. There is a sample of a verbed-out kick in the samples folder of our CD-ROM, called verbkick.wav (a mono sample). There

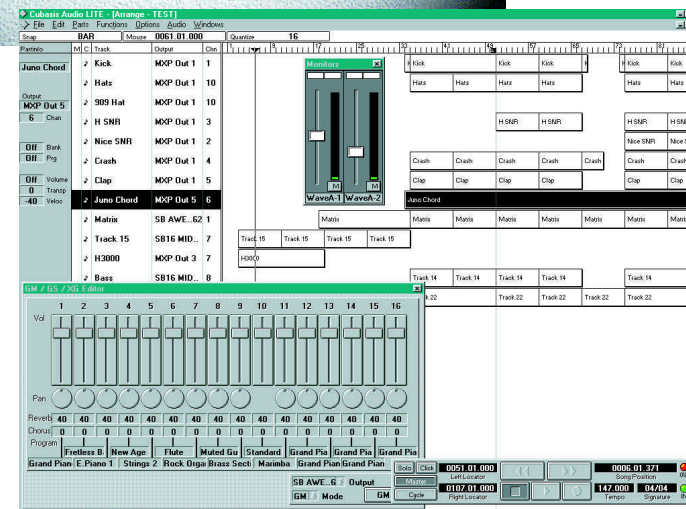
are also two other kick drums to add to your collection.

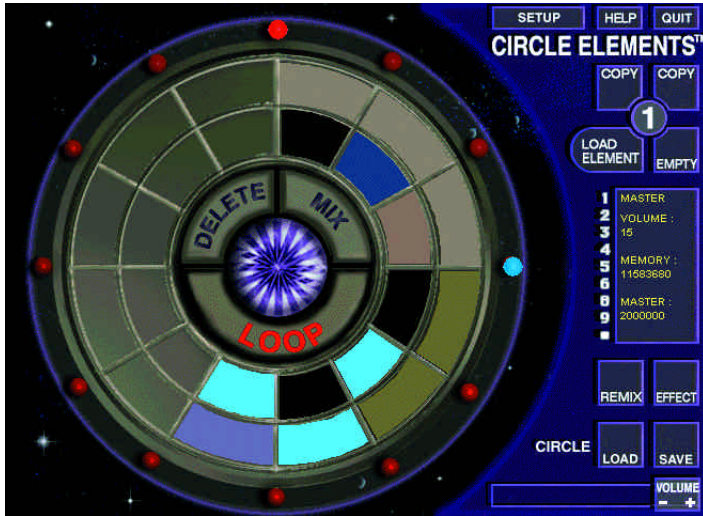
Hit me with your rhythm tricks

When you are limited by equipment, it can be difficult to achieve professional-sounding rhythm tracks, so you should opt to use drum loops. When working with loops, however, you are restricted to the groove determined by the sample.

Cutting a one-bar loop into eight segments can provide more flexibility because you can play in your own groove. If the drum loop is sparse, it may be possible to chop out individual hits, like snare and hi-hats. This can be achieved using any wave editor, such as Wave Studio. Simply mark the section you would like as a new sample, press Control C and paste into a new file. With up to eight samples on different keys, you have the freedom to sequence new grooves, and even leave out instruments.

If you have an Akai sampler, an even easier way to do this is to get hold of Recycle (see "PCW Contacts", page 314). This program analyses drum loops, works out where the individual hits are and cuts them out (Fig 7). It then creates new key





groups, assigns the new samples to them and sends them back to the sampler via SCSI. At the same time, a MIDI file is created to play the loop back in its original form. From then on, you can remove notes or create new grooves. It provides a lot of flexibility and is particularly useful for drum and bass tracks.

Big bundle for a thin wedge

Sound Engine is a new, low-cost, software and sample bundle from Time + Space. A shade under 40 notes buys you a copy of Steinberg's Cubasis Audio Lite, Circle Elements, Sound Lab and a multimedia dance music workshop. You can choose any CD from the 30-strong Creative Essentials library — they normally sell at £19.95 each.

Although Cubasis Lite is a stripped-

down version of Cubase, it nevertheless has 32 tracks for sequencing MIDI and wave files and has grid and notation editors for fine-tuning your performances. Circle Elements is a sample-based sequencer which comes fully-armed with hundreds of pre-recorded musical phrases and drum loops. You need no musical knowledge to achieve results, as the phrases are grouped by tempo and work together in almost any combination. You only have two tracks to play with, but once you have a tune on the go you can mix them down onto one track, freeing up

Fig 5 (left)
Arrange full-on dance tunes by loading musical phrases into the segments
Fig 6 (below)
I'm not sure about the name, but some of the effects are pretty good

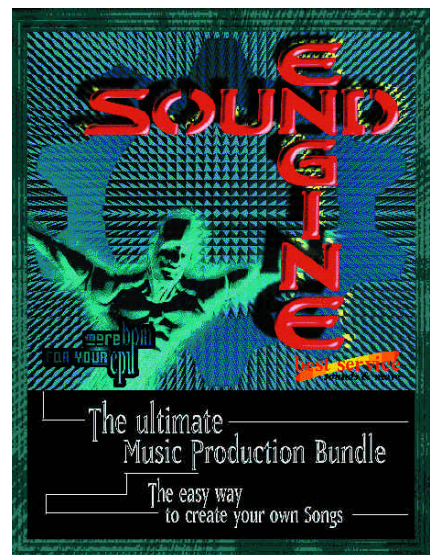
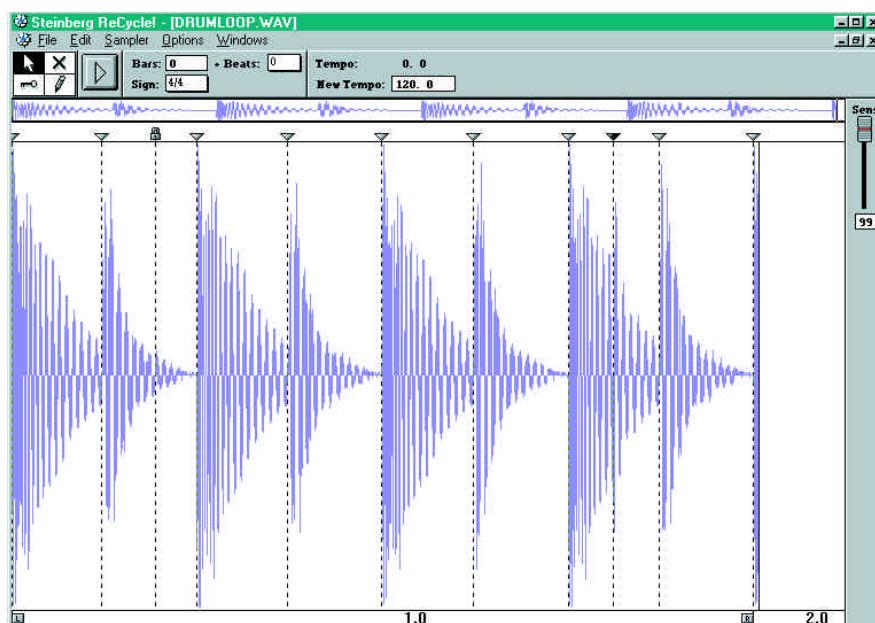
track two for more musical elements.

Sound Lab Fun Tool enables you to add effects to wave files. These include sweeping filters, flanging, bass boosting and primitive time-stretching. Once you have achieved the desired effect, you can export the new file to, say, Circle Elements or Cubasis.

The music workshop begins to explain the basics of piecing together a dance track. There is a glossary of terms and nice photographs of the TB303 and TR909, as can be seen in Fig 3.



Fig 7 Recycle analyses drum loops, finds the individual hits and cuts them out

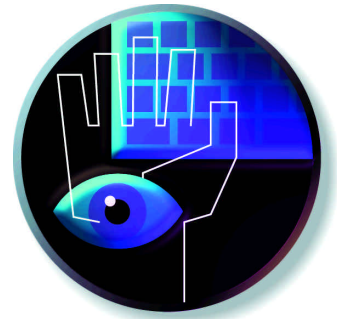


PCW Contacts

If you have any hints or tips, MIDI-related items or general comments, contact **Steven Helstrip** at the usual PCW address or email him at sound@pcw.vnu.co.uk

Recycle is available from Harman Audio
0181 207 5050

Sound Engine £39.95 (incl. VAT), House & Garage Construction CD £19.95 (incl. VAT), both from Time + Space 01442 870681, fax 01442 877266, email sales@timespace.com; web www.timespace.com



A new Deal

Tim Anderson checks out the new Formula One spreadsheet control in the latest upgrade to the Visual Developers Suite Deal, answers VB and Delphi queries and hides a blinking caret.

Visual Components has upgraded its Visual Developers Suite Deal, a collection of ActiveX controls for Visual Basic and other ActiveX clients. These are heavyweight components, each being almost an application itself. They are supplied as both 16-bit and 32-bit OCX controls. The runtime versions can be distributed royalty-free, making the Suite excellent value if you need this kind of functionality.

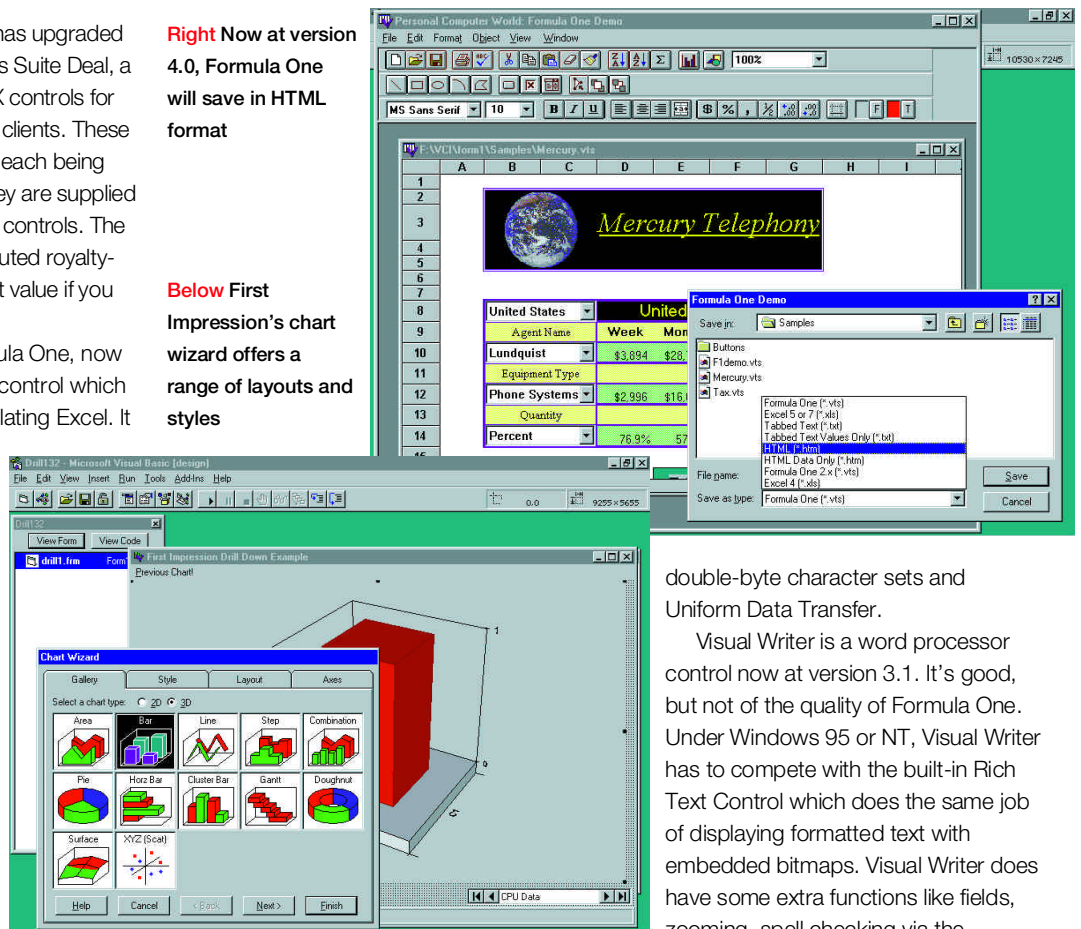
Cream of the crop is Formula One, now at version 4.0, a spreadsheet control which does a remarkable job of emulating Excel. It can read and write files in Excel format up to version 7.0, as in Office 95, but there are limitations: Formula One does not understand Excel charts or macros, for example. A large number of worksheet functions are supported, and the ability to move sheets to and from Excel is a valuable asset. Formula One has its own drawing tools and can link with First Impression, the charting control in the Suite Deal, to create charts. You can place buttons, checkboxes and drop-down listboxes on sheets.

New in version 4.0 is support for double-byte character sets, HTML export, and Uniform Data Transfer, an OLE standard which lets you drag and drop data between applications. Formula One is not a data-bound control, but it has built-in ODBC support so you can query an ODBC database and the results appear in a worksheet.

Version 4.0 includes several new ODBC functions. Another nice touch is the workbook designer, a fully-featured

Right Now at version 4.0, Formula One will save in HTML format

Below First Impression's chart wizard offers a range of layouts and styles



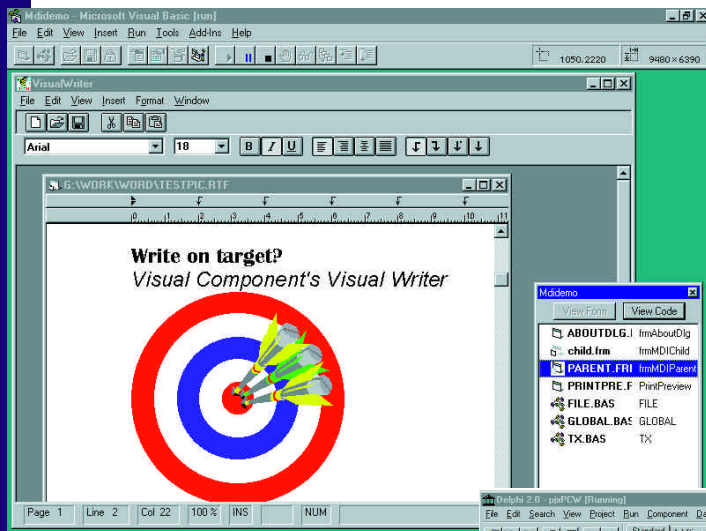
double-byte character sets and Uniform Data Transfer.

Visual Writer is a word processor control now at version 3.1. It's good, but not of the quality of Formula One. Under Windows 95 or NT, Visual Writer has to compete with the built-in Rich Text Control which does the same job of displaying formatted text with embedded bitmaps. Visual Writer does have some extra functions like fields, zooming, spell checking via the supplied Visual Speller control, print preview, and a ready-made button bar, status bar and ruler. It also has some quirks. Rich Text Format (RTF) is supported, but it prefers its own proprietary format. This is a disadvantage, especially since it will not accept .RTF as a valid format when bound to a document database. Also lacking is any kind of HTML support. For Windows 3.1 developers, though, Visual Writer or something like it is all but essential if you need to display formatted text. It's a shame the supplied 16-bit version is an

spreadsheet application which pops up on demand to enable you to create workbooks interactively.

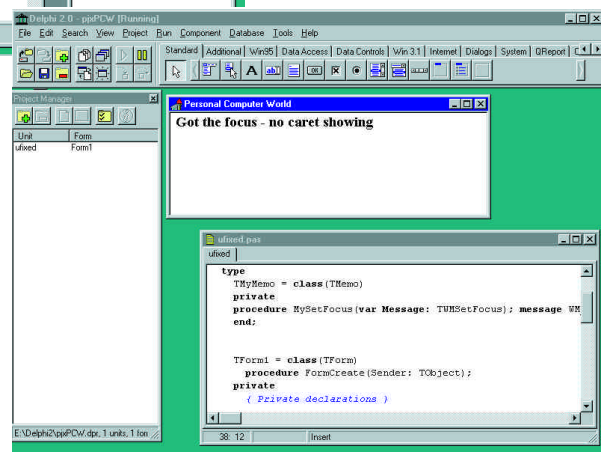
Formula One is superb and its main competition is from Excel itself. Excel is a strong development tool and its worksheets can be embedded in other applications and controlled programmatically. Excel is the more powerful, but in comparison Formula One is small, nimble and royalty-free.

First Impression, the Suite's charting component, is updated to version 2.1. Not much has changed, mainly the support for



Left Visual Writer is invaluable for 16-bit Windows but less useful in Windows 95

Below A solution to the flashing cursor problem. The TMemo object is subclassed, creating a component which is sufficiently general to be used many times over



OCX, as the VBX control type is more widely supported in Windows 3.1.

Carets and messages

The following question is asked by reader, Deborah Pate: "How can I stop the cursor flashing in a TMemo component on a form with no other control that can accept the focus? Setting it to read-only does not help."

This is a fair question, although I am not sure why you would not want the cursor flashing in a memo control that has the focus. Anyway, this is the kind of thing that should send you scurrying to the Windows API. One thing you must realise is that what most people call the cursor, Windows calls the caret. There are eight functions specifically concerned with this little flashing creature. For example, you can control the blink rate with SetCaretBlinkTime. Hiding the caret is just a matter of calling the right function. That is:

```
Hi deCaret (Memo1. handl e);
```

The remaining problem is where to call the function. The obvious place is in the OnShow event method for the form but it doesn't work. The memo component receives a SetFocus message after the form shows and that helpfully reinstates the caret.

The OnPaint event does the trick but this is not the best solution. In certain circumstances the memo control can receive a SetFocus message without the form's OnPaint event firing, and back comes the caret. If you call HideCaret in enough places you can probably make it watertight, but it's not elegant programming.

The best answer is to trap the SetFocus message itself. To do this you need to sub-

class the TMemo object, giving it a custom message handler. You can either do this entirely within your application, or create a new custom memo component and install it on the component palette. For a one-off, the first approach is fine, the only snag being that because you create the control at runtime, you cannot place it visually or use the Object Inspector. How it works is shown in Fig 1.

Of course, you will also want to set other properties and perhaps write event code for the memo control, all of which you can do in code. Sledgehammer to crack a nut? Maybe. But once you have learnt how to subclass Delphi controls, many other problems can be easily solved.

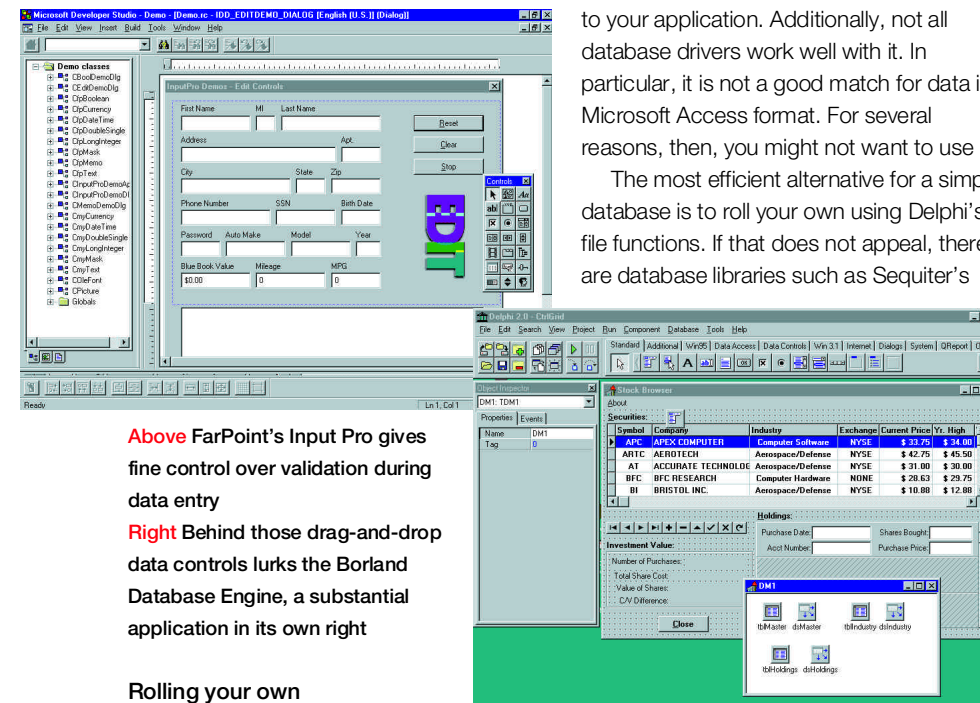
You can also build up a library of customised components which can be used many times over. For example, you could create a memo with a Boolean ShowCaret property that turns caret display on or off. In the long term, the productivity gains are enormous.

Input Pro

Once upon a time, it was Aware/VBX. FarPoint has renamed this set of data-entry controls to the more natural Input Pro. It is an unglamorous collection, but is also one of the most useful for anyone doing data entry forms in Visual Basic or other ActiveX clients. A VBX version is also supplied.

There is not much extra functionality in Input Pro, as opposed to Aware/VBX. The main difference is the move to

ActiveX. There are eight controls including currency, date and time, masked edit, and a memo control which overcomes the normal 64Kb limit. All are data-aware. The main purpose of InputPro is for validating data entry (never an easy task): its controls greatly simplify matters. For example, the DateTime control rejects invalid dates and times, can limit their range, and can auto-complete partial entries.



Above FarPoint's Input Pro gives fine control over validation during data entry

Right Behind those drag-and-drop data controls lurks the Borland Database Engine, a substantial application in its own right

Rolling your own

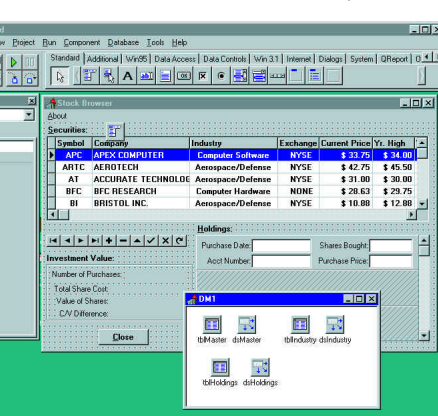
Reader Richard Hustwayte writes: "My project will require some databases to be made — nothing complex like client/server but simple, flat-file databases. I have looked at two versions of Delphi: the standard version (about £70) and the desktop version (about £230). The latter version is advertised as having the Borland Database Engine. What is this? And if I don't have it, am I unable to create database applications?"

All versions of Delphi come with the Borland Database Engine. This is a library of functions designed to simplify database work by acting as an intermediary between your application and the driver software which actually accesses the data. One benefit is that you can use data-aware components, so you can create simple database applications without writing any code. A number of database drivers are available for the BDE and it can also use ODBC drivers, the Windows standard for database access.

The BDE is good, but there is a cost involved. The BDE is a substantial piece of software and adds a considerable overhead

to your application. Additionally, not all database drivers work well with it. In particular, it is not a good match for data in Microsoft Access format. For several reasons, then, you might not want to use it.

The most efficient alternative for a simple database is to roll your own using Delphi's file functions. If that does not appeal, there are database libraries such as Sequiter's



CodePascal which provide a lightweight alternative. Then again, the BDE comes in the box and is fairly easy to use, so most Delphi developers do not look elsewhere.

Which Delphi book?

Darren Davies writes: "I'm just about to buy Delphi Developer 2.0. I was wondering if you could recommend a book to learn how to program in this language? I've had quite a bit of experience with Pascal for DOS and object-oriented Pascal for Windows, but not much with visual programming."

For someone with programming experience, a good choice is Delphi 2.0 Unleashed by Charles Calvert (SAMS). At 1,400 pages, it goes some way to compensating for Delphi's poor documentation.

A terminal problem

"I'm trying to get my new Terminal Program to automatically log in to a BBS. How do I get MSCOMM to wait for a login prompt before it enters the user details like Login name and Password?" asks Aaron Hodgson.

The MSCOMM custom control, which is

similar in Visual Basic 3.0 and 4.0, offers two ways of intercepting data. The first technique involves a program loop which continually checks the receive buffer, a technique called "polling". Fig 2 shows what it looks like in pseudo-code. While it is a useful technique, it is difficult to write a well-structured application if it spends much time sitting in a loop like this. Another method is preferable, which is to use the OnComm event to respond to incoming data. This event fires whenever a communication error or event occurs. You can respond with a select case statement, like that shown in Fig 3 (page 319).

Your code should respond to all the

Java books

Professional Java Fundamentals by Sly Cohen, Tom Mitchell and others

Most Java programmers are already skilled in another language: often C++. This book is aimed at that readership, providing a concise introduction to Java and focusing on its distinctive features. Beginning with a description of the Java language and object-oriented programming, it goes on to explain packages, threads and streams. Five chapters are devoted to the Abstract Window Toolkit, including a detailed explanation of various layout managers. The most advanced chapters cover networking, building libraries, implementing an application framework, and interfacing with C++.

There seem to be lots of poor Java titles around, and in contrast here is a knowledgeable and well-judged guide which complements rather than repeats what is easily obtainable online. Recommended.

Using Java (Second Edition) by Joseph Weber and others

The flash on the cover states: "Covers new JDK 1.1 features" which is a bold claim since, at the time of writing, the JDK 1.1 was still in beta. You will find some useful material on JDBC database classes and a little on remote method invocation but, of course, much of JDK 1.1 is not actually included. What you get is over 1,000 pages which take you step-by-step through Java's tools, language, classes, applets and applications, graphics and layout, security and more. There is an emphasis on Sun's tools rather than third-party contributions, although the online version includes a chapter on different development environments.

Overall, Using Java is a thorough guide, although at times rather ponderous and unexciting. On the CD, you get online versions of four other titles covering JavaScript, Visual J++, CGI scripting and HTML, along with additional chapters and example Java applets. As a one-stop Java reference library, this book is hard to beat.

Fig 1 Trap that SetFocus

- In the type section of the form unit, declare the following object:

```
TMyMemo = class (TMemo)
  private
  procedure MySetFocus (var Message: TWMSetFocus); message WM_SETFOCUS;
end;
```
- In the public declarations for TForm1, include:

```
Memo1: TMyMemo;
```
- In the implementation section, include:

```
Procedure TForm1.MySetFocus (var Message: TWMSetFocus);
begin
  inherited; {call the default handler for this message}
  hide caret (sel f. handl e); {hide the caret}
end;
```
- In the FormCreate method, include:

```
Memo1 := TMyMemo. create (sel f);
Memo1. Parent := sel f;
Hi deCaret (Memo1. handl e);
```

Fig 2 Pseudo-code for "polling"

```
Begin do loop
  DoEvents or Sleep to allow windows to run other processes
  Check InBufferCount property
  If there is data, read input property and add to string buffer
  Check buffer is not too full and correct if necessary
  Check for time out, data complete, broken connection or other errors
End do loop
```


Fig 4 WaitFor function

```

Function WaitFor(sWaitString As String, ITimeout As Long) As Integer

Dim IStartTime As Long
Dim sBuffer As String
Dim iOldThreshold as integer

IStartTime = Timer
iOldThreshold = Comm1.RThreshold
Comm1.RThreshold = 0
' prevents comEvReceive firing

Do
DoEvents ' or call Sleep API function
If Comm1.InBufferCount > 0 Then
sBuffer = sBuffer & Comm1.Input
' should check for buffer too large
End If

If InStr(sBuffer, sWaitString) > 0 Then
WaitFor = 0
Exit Do
End If

If Timer >= (IStartTime + ITimeout) Then
WaitFor = 1
' you can define constants and report errors
' using the return value
Exit Do
End If

Loop

Comm1.Rthreshold = iOldThreshold

End Function
    
```

Now you can write code like this:

```

If WaitFor("Login: ", 60) = 0 Then
' waits for up to 60 seconds
Comm1.Output = "qi x" & Chr(13)
MsgBox "Successfully posted response"
Comm1.Rthreshold = 1
' Enables comEvReceive event
Else
MsgBox "Login error"
Comm1.PortOpen = False ' Closes port
End If
    
```

possible events in order to trap communication errors. You also need to check that the string buffer is kept to a reasonable size. Using the CommEvent it is possible to write a reasonable communications program in Visual Basic, and there is an example called VbTerm that comes with Visual Basic.

Although the event-driven approach is better for most purposes, Aaron's particular problem can easily be solved by polling. You can write a WaitFor function that doesn't return until a particular piece of data

has been sent, or until an error has occurred. An example of this is shown in Fig 4.

Note that if you have also written code to respond to the OnComm event, you need to ensure that events of the type comEvReceive do not fire when the WaitFor function is running. You can do this by setting the Rthreshold property to zero.

Finally, communications code is tricky, mainly because so many things can go wrong. At one extreme, poor lines and

dropped connections cause difficulties, while the opposite problem is data coming in so fast that some part of your software cannot keep up. If this last problem occurs, Microsoft makes two recommendations. One is to extract data immediately the OnComm event fires, without bothering to check the type (see Fig 5). Also, the MSCOMM control may not always be satisfactory and as a last resort you can call the Windows API directly. This is well covered in the first edition of Daniel Appleman's *Visual Basic Programmer's Guide to the Windows*

Fig 3 A select case statement

```

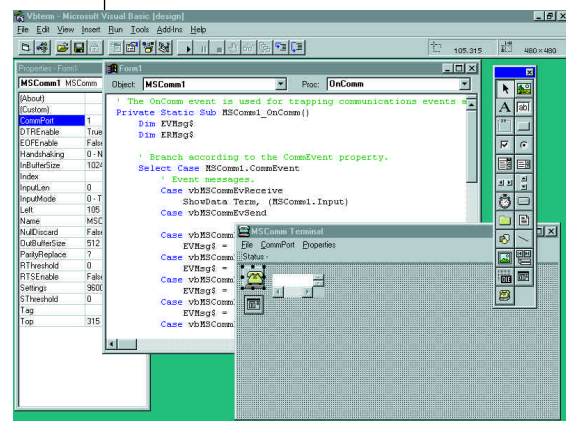
Select Case Comm1.CommEvent
Case comEvReceive
sBuffer = sBuffer & Comm1.Input
' or send to data processing function
Case comRxOver
MsgBox "Error: receive buffer
overflow"
Case comTxFull
MsgBox "Error: transmit buffer full"
End Select
    
```

Fig 5 Extract data

```

Sub Comm1_OnComm ()
Static ReceiveBuffer As String
ReceiveBuffer = ReceiveBuffer &
Comm1.Input
Etc...
    
```

API but not in the second, 32-bit edition, although there is some material on the CD which accompanies the book.



Above The VBTerm sample comes with Visual Basic and demonstrates the use of the MSCOMM control

PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted at the usual PCW address or at visual@pcw.vnu.co.uk

Visual Developer's Suite Deal is £235 (plus VAT) from Visual Components 01892 834343
 Input Pro (FarPoint) is £105 (plus VAT) from Contemporary Software 01344 873434

Professional Java Fundamentals, by Sly Cohen, Tom Mitchell and others is £32.49; ISBN 1-861000-38-3, published by Wrox Press.

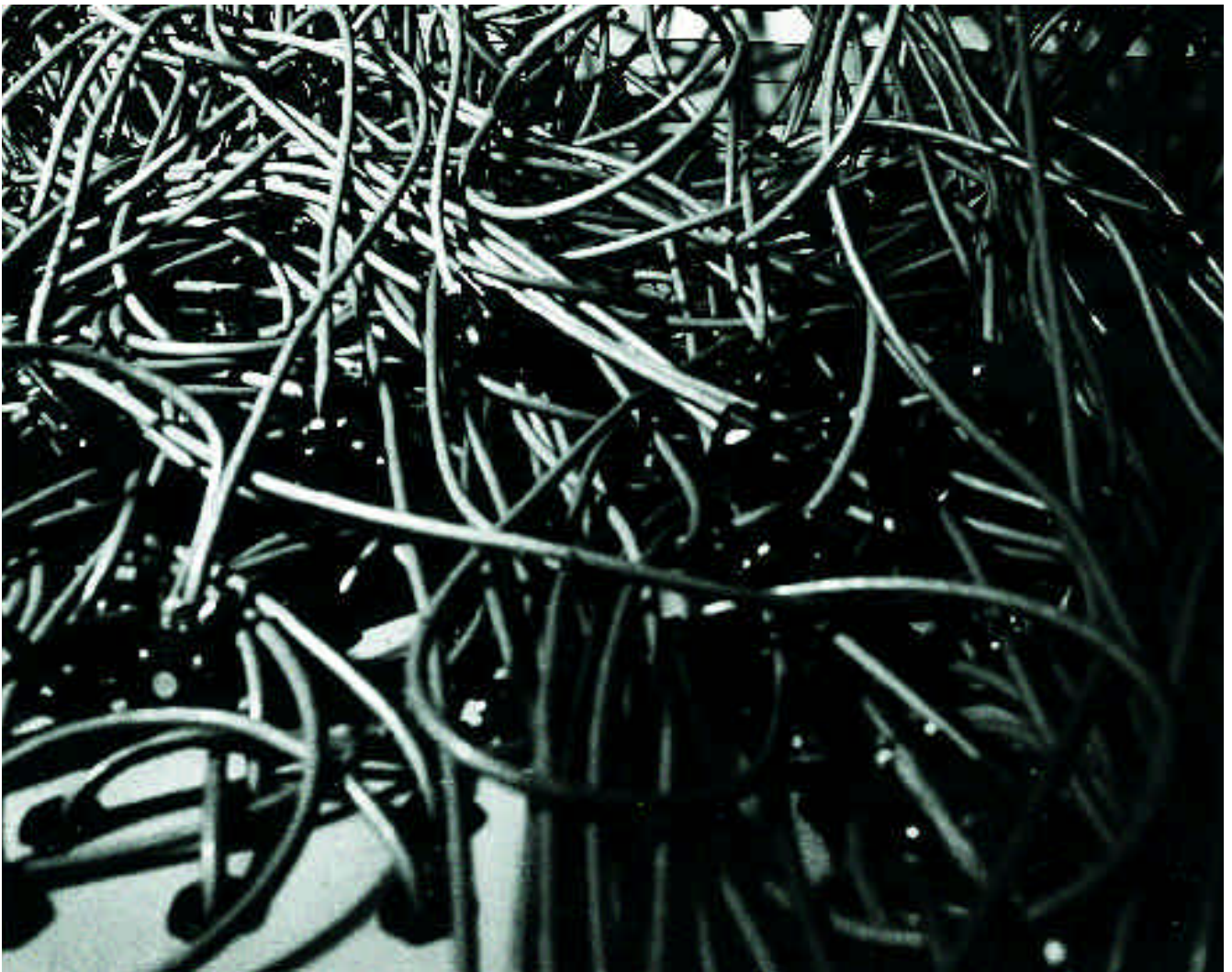
Using Java (Second Edition) by Joseph Weber and others costs £56.49 (incl. VAT); ISBN 0-7897-0936-8, published by Que.

Delphi 2 Unleashed by Charles Calvert costs £54.95 (incl. VAT); ISBN 0-672-30858-4. These books are available from Computer Manuals 0121 706 6000



Cabling for company

Mark Baynes and his colleagues have a new office. All they need now is to get it networked. Mind you, there's always the good old shouting-up-the-stairs routine to fall back on. Plus, The Squirrel tries LAN management, and Dell's PowerEdge serves up a treat.



During the past few weeks I have been running around like a mad thing cabling up the office so that my colleagues and I could enjoy basic networking comforts like sharing a printer and sharing files on the file server as we get

our first few web sites under way.

We all met while taking an MA in Multimedia at Sussex University and, in the multimedia lab at that time, we did not have a file server or any form of networking apart from internet access. The main reason we

were not networked to each other was because the university systems staff thought that we would start sending multi-megabyte multimedia AVI files to each other (and yes, we would have); this potential problem being exacerbated by our position

p322 >

on the university system. So what we did was simply shove files onto the PD drives with which the PCs were equipped and transferred them from one machine to another in this fashion — fine, but at times a bit of a pain.

Of course, the first day in the office, one of my colleagues could be seen wandering from one networked PC to another with a floppy disc in his hand because his files were in different places. I must admit I did wait until 5.00 p.m. until I explained that because all the files were on the file server, and that all the PCs were connected to the file server, he did not need to do this... Well, it kept me amused.

Another communications problem we have is that our offices are on three separate floors. We do not have an internal telephone system installed, so this leads to us conducting conversations while leaning over the banisters and shouting at each other. Someone suggested that we should get some whiteboard software installed on the LAN but I think it might be a lot cheaper and more efficient to buy an intercom. The low-tech solutions are usually the best. Or we could move to a single, larger office. But then we would have no good reason to shout at each other — not.

Getting kitted out

A friend of mine, with whom I occasionally undertake network consultancy (aka The Squirrel), has been tearing his hair out trying to make a newcomer to the wonderful world of LAN management understand that running ten networked PCs is ten times as complex as running ten standalone PCs (although you get far more than ten times extra productivity from the networked system), but to little avail.

This LAN newbie is a real gadget freak whose main goal in life seems to be to spend as much money as possible on a new 18-node network that he wants installed, irrespective of what he and his company actually needs to get the job done. (At the moment every PC has its own printer— honest.) Unfortunately some other networking firm, the employees of which all wear Stetsons, shoot from the hip and call their company cars Tonto, are intent on fulfilling the newbie's dreams and letting him spend about £30,000 more than he needs.

I have this nasty feeling that if everybody only bought the amount of networking kit they needed, rather than what they wanted to play with, then the network industry

would be only half the size it is. We have mixed feelings about Mr LAN Newbie. Yes, we could get a nice contract, recommend and install kit for only half his budget which would do the job he wants it to do, and we could make a profit; but would he actually realise that it was capable and that we had done a professional job for him?

There is the occasional temptation to agree to install the massive file server this guy has wet dreams about, and the extra 16Mb RAM in every PC he insists is necessary, but we both think it would make for a much easier life to just forget about the whole thing.

Server sense

Anyway, back to the subject of this month's column, which was going to be "Ethernet and Fast Ethernet explained". But it ain't, for the simple reason that a Dell PowerEdge server has turned up for review (see the separate review, opposite) so I am going to talk about file servers instead.

Exciting, huh? Well, more interesting than a load of theory about collision detection, anyway. I have fond memories of Dell servers because the first EISA server I ever configured was a Dell and somehow I managed to do it without (a) the manuals and (b) any knowledge of what an EISA server was.

One of the first things to bear in mind when buying a server is that it is not a go-faster PC. Yes, it may have a faster CPU, more RAM and more hard disk space, but the main requirements of a server are that it is built like a tank and that it is reliable. If someone tries to sell you a server on the basis that it's got a really high-end graphics card, walk away: you only need a basic colour monitor and they do not know what they are talking about.

If the system unit cover is a pain to remove, then it is highly likely that the whole system has not been designed very well. Look inside the unit and see if the wiring is carefully arranged and tied back so that you can access the cards and system board. Can you upgrade the RAM without having to remove any of the network cards? Are the standard hard drives from a good-quality company? Can you buy a RAID system from the same manufacturer?

Ignore any benchtests. Benchtesting of PCs such as you find in *PCW* or other mags are usually good indicators of performance, but benchtesting file servers is complete and utter nonsense. Most benchtests of file

Dell PowerEdge 2100/200

The Dell PowerEdge 2100/200 arrived for review installed with a 200MHz Pentium Pro with 256Kb cache, 64Mb EDO RAM and 2Gb Seagate SCSI drive, and integrated Adaptec AIC-7880 ultra-fast and wide SCSI controller. There was also an NT Server v3.51 (4.0 by the time you read this) and an Intel LANDesk Server Manager v2.5 pre-installed. Integrated server management circuitry monitors the state of the system fan as well as other critical system voltages and temperatures in conjunction with LANDesk, so you can find out exactly how hot your Pentium runs (Fig 1), the activity of installed network cards and protocols (Fig 2) and just about everything else.

The PowerEdge has a mini-tower type of system unit which is quite wide; a minor but important point as it is quite difficult to accidentally tip a unit with the dimensions 44.45 high x 24.13 x 41.91cm deep and weighing 17.68kg. The front of the unit is dominated by a large ventilation grille which, in conjunction with the large and noisy fan at the rear of the unit, should maintain the airflow over the system board and the hard drives.

There are the usual floppy and eight-speed CD-ROM drives and one free bay for a tape device. Plus points to Dell for taking the trouble to recess both the power and reset buttons so that there is no way they can be hit in error. Between them there is a SCSI drive activity light. The rear of the unit is fairly unexceptional, with the usual I/O ports and such like, except for a blanking plate where you can install a

system cabling which is neatly bundled together and attached to the top of the unit. There are three EISA/ISA and three PCI slots available. One of the PCI slots is occupied by an Intel EtherExpress Pro/100 Ethernet adaptor which can auto-sense whether you have a 10Mbps or 100Mbps network connection.

Although NT Server has always had basic system management software included, you really need a third-party solution and Intel's LANDesk Manager is a good option. The amount of detail it provides you with is more than adequate for the majority of daily LAN management tasks you will undertake, and if you take the time to configure it properly, you will have a comprehensive system available

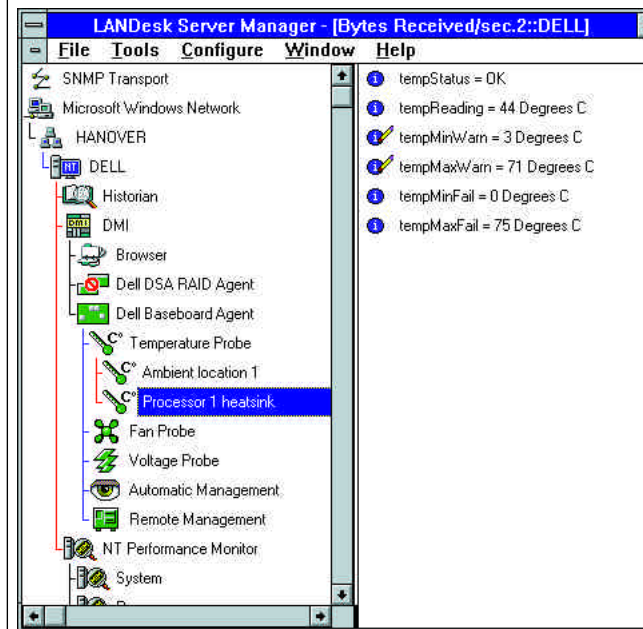
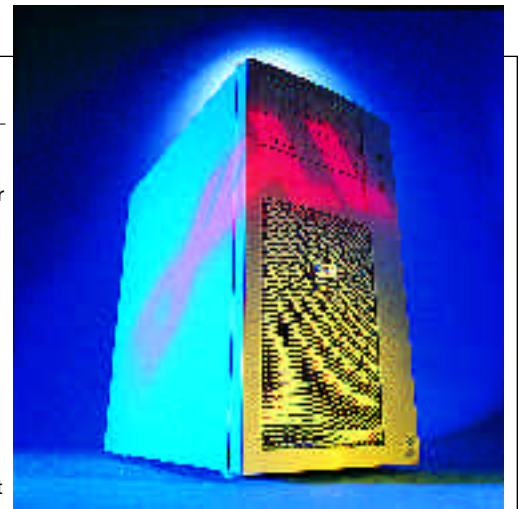
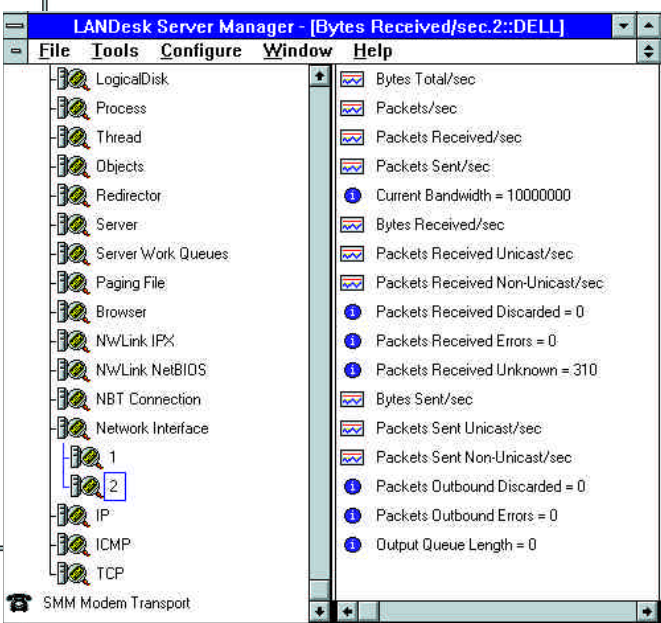


Fig 1 (above) LANDesk Server manager showing Dell Baseboard Agent details of Pentium Pro temperatures

Fig 2 (below) LANDesk Server manager showing the activity of the network card



server management unit if required. Removing the rear casing is fairly straightforward because once the security lock has been removed there are only four screws to be undone and the cover slides off easily to the rear.

Inside, the unit is neat and tidy with plenty of room to work when installing extra network cards. The Pentium Pro itself is hidden beneath a massive heat sink at the top of the system board. The four RAM slots are easily accessible and are not obscured by any of the

which should make your working life more bearable. Documentation is very good — just about the best I have seen.

I attached the PowerEdge to my system and used it as an auxiliary server for several weeks, and found it to be tough and reliable. Pricing for the system specification reviewed here at the time of writing was £3,878 inclusive of 15in colour monitor, NT Server and LANDesk Manager, so the PowerEdge should be near to the top of your list when considering a new server for your LAN.

■ Dell Computer Corporation 01344 724883

servers are usually just tests of the network card. But even if there were such a thing as a valid benchtest of a file server, it would still be of dubious value because the benchtest was not undertaken on your particular network.

Think of your LAN as one big distributed computer of which the file server is one (but not necessarily the most) important component. A benchtest of your file server is rather like benchtesting the latest Pentium CPU without reference to the system within

which it will run. If it is put in a well-organised system, a fast CPU will improve performance. But put the same CPU in a badly organised system and it may not improve performance at all. Get the idea? The same is true of file servers within a LAN.

Which brings me to my final point. If your LAN is running slowly, do not think that merely buying a new server is going to make it run faster. You would probably be better off taking the time to analyse the performance of your LAN over a few weeks and properly identifying the cause of the problem. If you then find that the server *is* the problem, analyse server performance for a while.

If you have exhausted all possibilities, then think about buying a new one, but not before. You could find that spending £150 on a new network card would give your LAN just as much of a performance boost as a new server.

But now I must turn my attention to the most fundamentally important LAN management task that I have yet to undertake — getting the first networked game of Quake under way!

Questions & Answers

I have just started to receive the first of your letters and have been intrigued by the variety among them. If I cannot find an answer to one of your queries, I will let you know, but I hope that I will be able to help in the majority of cases.

Don't be afraid to ask really simple questions because quite often these are the ones that other people would like to ask if they were not so shy. And, if you have any useful information you would like to share, do let me know.

A modem shared

Q. "I read in your Networks column in the December issue of Personal Computer World that you were installing a modem as a shared device on an NT Server. How is this done? I can't find any option in NT Server to allow you to share a modem."

Chris Langford

A. NT's Remote Access Service (RAS) is primarily designed for remote access by remote nodes and does not support a dial-out modem pool for users on a LAN (which is what you and I want to do) but there are third-party products which allow you to do this. One of these is SAPS modem sharing software from SpartaCom (tel 0181 357 3600; web address www.spartacom.nl) and costs around £95 for the single-modem NT server licence and £195 for five-client licences. I reviewed a previous version about 18 months ago and remember it as being simple to install and effective. However, I have the latest version on order and I hope to review it in Hands On soon.

Home network

Q. "I am an avid reader of Personal Computer World and enjoy your Hands On Networks section, even though I don't yet run a network! I would nevertheless appreciate some advice on a networking issue. I am a student attending Nottingham Trent University, taking a computer science degree course. We have just started to learn Java for producing client/server

software for a distributed systems module. In order to be able to do this work at home, I need to set up a TCP/IP network on my Windows 95 machine. I do not have a network card, but was wondering if it were possible to set up a form of network on a standalone PC?"

Mark Jessop

A. You cannot really set up a network on a single PC, but then, this doesn't matter because for your purposes you don't need to. In order to be able to access the internet from a Win95 PC you have to set up TCP/IP (via the Microsoft network client) on it, as this is the protocol on which the net runs. When you connect to the net, your PC becomes part of the network. The reason you can do this is that a modem is regarded by Windows 95 as a "dial-up adaptor" and this is what TCP/IP is binding to. However, I do not know the full details of what you want to do with yummy Java (although I am running a web design company, I am avoiding having to learn it — I found Prolog was bad enough) but I suspect this might take you part of the way. If you do not have a modem, however, you may well be stuffed. Sorry!

PCW Contact

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Fighting talk

Operating systems: aren't you sick of them? Everywhere you look, someone is crowing about the advantages of OS X while putting the boot into OS Y. Howard Oakley has had enough.

In common with many people, I find the popular online game of OS Wars extremely tedious. Like it or not, though, Apple, Microsoft, Sun, Be and anyone else wanting to enter the fray has the vital task of convincing the public that their particular operating system is distinct from the others, in ways which are obviously advantageous. I think this is what our American friends refer to as "leveraging", which conjures visions of Archimedes trying to move the globe with the Greek antecedent of a caber.

You can split hairs and argue ergonomics over the human interface, but one area in which Mac OS is highly distinct, and which users and Apple adverts should be leveraging like a contestant in a strongest man contest, is AppleScript. Unfortunately most of the original AppleScript development team have long since left Apple, and I begin to wonder if anyone in marketing even remembers its existence. Look through the old development code examples which were provided to help code geeks implement support for AppleScript in their applications, and you'll see names of luminaries like CK Haun, who not only left Apple years ago, but also left Be some months ago.

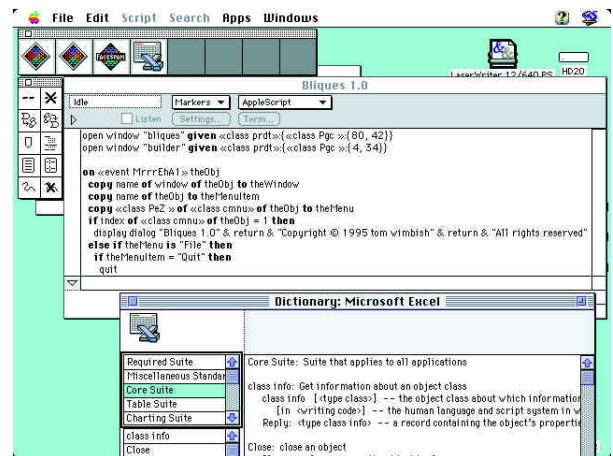
AppleScript is a sophisticated near-English programming language with which you, as an ordinary user, can control and co-ordinate shrink-wrapped applications. Introduced with System 7, it works with applications supporting AppleEvents, which are to AppleScript what keypresses are to the keyboard. In other words, when you run a script, it is converted into AppleEvent messages sent to the target application, which are handled by the target in among the mouse, keyboard, and other items

If you fancy writing your own AppleScripts, Scriptor offers all the tools you'll need, including a dictionary browser and a sophisticated debugger

which are able to generate events.

Part of the OS war game among many Mac fans is to take every opportunity to castigate Microsoft, in particular claiming that Office for Macintosh is all part of some conspiracy to convert Mac users to Windows 95. This theory is half-baked in many ways, not least of which is the fact that Microsoft applications include extensive support for AppleScript; in fact, armed with AppleScript and Visual Basic for Applications (VBA), Excel for the Mac is superior to its Windows-hosted sibling.

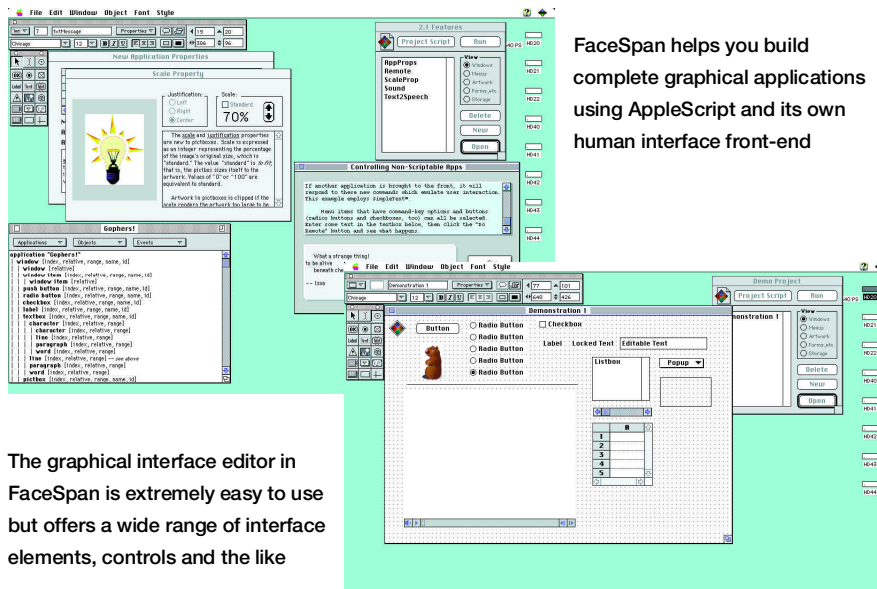
One of the reasons AppleScript has not set the world on fire is that, by some bizarre quirk of fate, Apple seems to have lost all its development team before it could complete the necessary suite of development tools. The rudimentary Script Editor which ships with each copy of System 7 is clear and simple, but falls far short of being a proper tool for script development. Another serious omission in older versions of Mac OS was that the Finder, arguably the most important application for scripting, was not scriptable (although this is not true of recent releases). Although Apple put a lot of early effort into defining the AppleScript language and suites of script commands and objects, and making them accessible via dictionaries, few applications became recordable. (That



is to say, you can step through a series of actions and have them automatically recorded as a script).

One of the first and most essential features of any script development tool is the facility to debug code which is not working as it should. This is not just for experts; indeed, good debugging facilities are more important for beginners, so that they can track down their errors rather than just getting frustrated and resorting to something more pleasurable, like poking themselves in the eye with a broken bottle.

Various third parties came up with improved development environments, including Paul G Smith, one of the co-founders of Full Moon Software Distribution, purveyors of fine scripting and other development tools to the UK and quite a bit of Europe. But the most durable, and now by far the best, is Scriptor 2.0. If you're daunted by the idea of programming your Mac in any way, you should take a look at Scriptor because it is not written to satisfy the needs of nerds. It is a highly accessible script development tool designed to work with FaceSpan, one of the most wonderful



FaceSpan helps you build complete graphical applications using AppleScript and its own human interface front-end

The graphical interface editor in FaceSpan is extremely easy to use but offers a wide range of interface elements, controls and the like

pieces of software I have ever seen. Like all the best and most innovative software, you wonder why no-one had thought of FaceSpan before. It is an application generator which uses AppleScript as its programming language, giving you free rein to do what you will in your own application, and to control others.

To illustrate how recursively wonderful this is, you can even script the FaceSpan development environment using FaceSpan.

An integrated graphical interface editor, of the kind popularised but not invented by Microsoft's Visual languages, helps you to construct the user interface, behind which are gobbets of AppleScript to make it all work. You can run FaceSpan projects within the FaceSpan application, or extrude them as standalone applications. Attesting to the wisdom of this approach are the Apple Network Servers, which are administered remotely using AppleScript

with a FaceSpan front-end. So armed with Scripiter and FaceSpan, and a selection of standard books including *Danny Goodman's AppleScript Handbook* (Second Edition, Random House) or *The Tao of AppleScript* (Second Edition, by Derrick Schneider, Hayden Books), plus Apple's *AppleScript Reference: English Dialect* (Addison-Wesley), the world is your oyster.

Perhaps the biggest shortcoming with AppleScript, however, has been what you cannot do with it. If an application has support for, say, copying all worksheet cells greater than ten, pasting them into the next sheet and sorting them into rank order, then scripting that sequence is straightforward. But many major applications fall short in various respects, most commonly in handling dialogs. It is not uncommon to find yourself blocked by a dialog, a brief piece of interaction which mars a script.

FaceSpan 2.1, the latest version, overcomes this problem in an obvious but ingenious way. It provides two new script commands: "click as user" to mimic mouse actions, and "type as users" to mimic keyboard input. Armed with these, you can get past most previous stumbling blocks.

Innovation lives!

A frequent riposte in the OS Wars game is that Apple no longer innovates. I recently stumbled across one of many active projects which attest to continuing innovation: Project X, a "fly-through" web navigator which links neatly to the web browser of your choice.

It is worth checking out hot and new items on a range of Apple's sites from time to time so that you keep abreast of these new ideas. Some, like the Communications Toolbox, will fly for a while and then die. Others, like OpenDoc, promise to change the face of computing.

Next month I'll look at how OpenDoc is taking off, and how it fits into Mac OS 7.6 and beyond.

A quick guide to Apple network protocols

Whether you're trying to decipher an error message or get a mixed network up and running, these are AppleTalk's catchily-named components:

LocalTalk A physical connection using a variety of different cabling systems to connect the printer serial port to a network. Not to be confused with AppleTalk itself.

EtherTalk A physical connection using any of the ethernet cabling schemes.

TokenTalk A physical connection using a Token Ring cabling scheme.

AppleTalk The suite of networking protocols which can be run across any of these physical connections.

LAP (Link Access Protocol) The lowest level software protocol which is run over the physical connection: it comes in different varieties for EtherTalk (ELAP), LocalTalk (LLAP), and TokenTalk (TLAP).

DDP (Datagram Delivery Protocol) The next lowest level software protocol, this time common to all AppleTalk variants, which provides and exchanges data between sockets.

NBP (Name Binding Protocol) Discovers named entities on the network and then supports their proper addressing.

ZIP (Zone Information Protocol) Supports the division of large networks into zones, and communication between them.

RTMP (Routing Table Maintenance Protocol) Acquires and maintains a list of routes to support the transmission of messages over the network.

ADSP (AppleTalk Data Stream Protocol) Provides a "pipe" for the reliable exchange of data between two applications.

AEP (AppleTalk Echo Protocol) Supports reliable communications over DDP.

ATP (AppleTalk Transaction Protocol) Provides reliable transfer of data between network entities: typically used to move files and other data between two systems on the network.

ASP (AppleTalk Session Protocol) Extends ATP by helping it transfer an ordered sequence of data.

AFP (AppleTalk Filing Protocol) Supports the cross-system and cross-platform sharing of filing system information, including file sharing and program linking.

PAP (Printer Access Protocol) Connects workstations and printers, and supports communications between them, including the sending of PostScript documents to the printer.

SNMP (Simple Network Management Protocol) A cross-platform system for managing local and remote network connections. Although AppleTalk can support this, so do most other networking systems.

PCW Contacts

Howard Oakley is pleased to hear from Mac users. Contact him at mac@pcw.vnu.co.uk Apple Computers: phone 0181 569 1199; web home pages www.apple.com and www.euro.apple.com.

Scripiter 2.0, costs £169. FaceSpan 2.1, costs £207.50. Distributed in the UK by Full Moon Software Distribution 01628 660242, which can also supply the AppleScript books. Project X is available free of charge from mcf.research.apple.com/ProjectX (All prices are exclusive of VAT).

Inside story

However reliable PCs become, it's still good to understand what's going on on the inside. Covering the hardware basics like CPU, RAM, cache and hard disk, Eleanor Turton-Hill explains what's what and why it's there.

PCs are more well-behaved than they used to be and you no longer have to be a technical wizard to use one. But despite continual advancement in hardware and software, the PC is prone to the odd relapse, and when things go wrong it helps to be armed with some knowledge of basic principles.

This month I'll give you an overview of what's inside your machine and how it works. Rather than focus on specific hardware products, the emphasis here is on the basic components required to make a computer work. All computers (not just PCs) have four basic elements: a processor, memory, storage devices and I/O devices. Each part serves a specific purpose and they must work together to make the whole system function correctly.

CPU

One of the first things you'll hear people talking about is the type of processor in their machine. This is the central processing unit (CPU) and is the most important component in the machine because it processes data and controls all the other parts of the computer. Even the simplest processor is a complex device, so I'm not going to go into great detail here, but it is useful to have an outline of its main functions.

If you take the lid off your computer you will see several flat black blocks stuck to a

green board. The CPU is the big square one usually marked "Intel" but sometimes "Cyrix" or "AMD". The processor stores, moves and manipulates data. It can only do simple things like move numbers from one place to another or perform basic mathematical operations, but it does these things quickly.

The CPU works by continually retrieving instructions from the memory that tell it where to get data, what operations to perform on the data and where to store the results. The particular instructions which the CPU is following at any one time are determined by the program it is running. If I say that my computer is able to produce reports, what I mean is that it has a program which instructs the CPU to execute a particular group of instructions which create a report. Similarly, if I say that

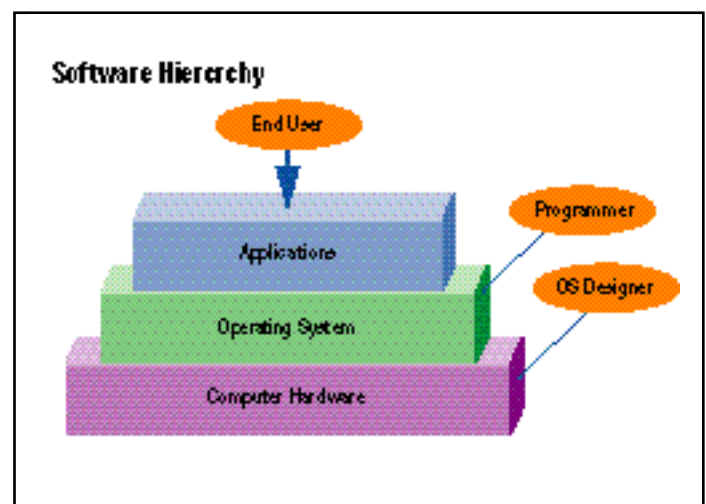
my computer knows my friend's phone number, what I actually mean is that the number is stored on my PC's hard disk.

Often the CPU performs several operations on the same data, or may need to hold the result from one operation, to be used on the next. Such data needs to be stored somewhere close at hand, so it is put into address registers and data registers on the CPU itself. This prevents the processor from having to access the memory every time it generates data.

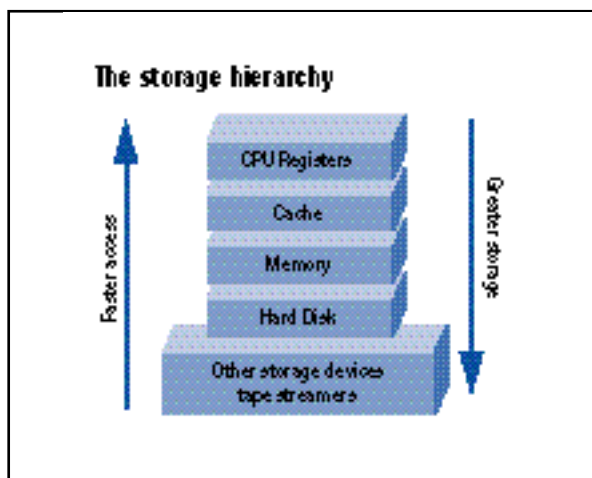
RAM

One of the concepts which gets confusing for beginners is the location of data. The CPU spends its time fetching instructions, and executing them according to what program is running. But where is the data? Is it in the hard disk, the memory or the cache? The answer is that data is continually moved around. It's in different places depending on the particular stage of the CPU cycle. The CPU can perform operations directly on data stored in its own registers, but it can perform operations on the data in memory and on data stored on disks or tapes. But data on your hard disk or tape must first be brought into memory

p328 >



The most important piece of software on your PC is the operating system. This sits in the layer above the physical machine, masking the hardware details from the end-user and providing the programmer with a convenient interface for developing applications.



The PC uses a hierarchy of memory storage technologies. As you go down the hierarchy, the cost per bit decreases. To make a system which is economically viable, the smaller, faster, expensive memories are supplemented by the larger, cheaper, slower ones

before the CPU can do anything with it.

RAM stands for Random Access Memory. It's the working memory used by your computer to store instructions and data before they can be committed to the hard disk. Because RAM works much faster than the hard disk, its used for handling all the data which is in constant use while programs are running. The hard disk is used for dumping any data which the system is not currently processing.

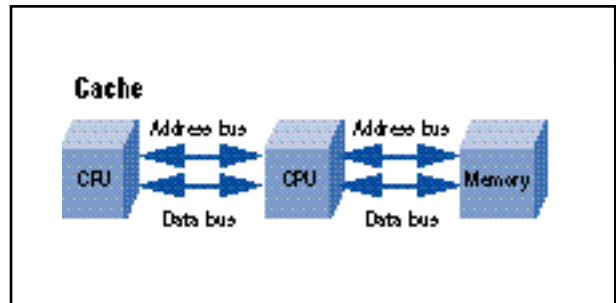
Cache

Modern computers have a large amount of memory compared to the first PCs of the early eighties, and this has had an effect on development of the PC's architecture. Storing and retrieving data from a large block of memory is more time-consuming than from a small block. With a large amount of memory, the difference in time between a register access and a memory access is very great, and an extra layer is required in the storage hierarchy.

A device called a cache sits between the CPU's registers and main memory. The cache is much faster than main memory but slower than the CPU's registers. Its advantage is that it can hold more data than can be held in registers and it can work more quickly than main memory.

When the CPU goes to read data from a certain address in memory for the first time, the cache goes to find it from memory. When it has retrieved the data, it records the address and data in its own fast memory. Eventually, the cache's memory

Data and addresses are moved around between the CPU, cache and memory via buses. Because the cache provides data at high speed, it can dramatically improve the performance of the whole system



fills up with records of addresses and data that the CPU has requested and when those same pieces of data are requested again, they are taken directly from the cache. When the requested data happens to be in the cache, a "cache hit" is said to have occurred. Any requests which are made for data which is not already in the cache result in a "cache miss", and one of the records in the cache is then replaced.

Hard disk

The hard disk is the part which holds all the programs, documents and data when your PC is switched off. The longer you have your computer, and the more documents you create, and the more data you store, the more valuable your hard disk becomes. In fact, hard disks which crack up can put small companies out of business in a flash. Your hard disk is the storage place for all your valuable work.

The programs which you run (ie. your word processor, graphics package or spreadsheet) are replaceable. When you buy your PC, you'll often get some of this

software pre-installed on the hard disk, but you'll also get a set of floppy disks or a CD-ROM which you can use to re-install the software if anything goes wrong. Anything else you create should be instantly backed up onto a spare floppy disk or to a removable hard disk.

The hard disk inside your PC is made of aluminium alloy covered with a magnetic coating. This makes the disk itself a pretty rigid plate, hence the name "hard" disk. Hard disks are completely sealed inside the disk drive and are not removable like many other media. They also spin quickly and have high recording densities which means they must be kept free from dust and any other kind of environmental contamination if they are to be maintained properly.

Thankfully for the user, most hard disks look much the same and people rarely know much about their internal workings. Hard disks have changed radically over the years, especially in terms of capacity. The smallest hard disks held a tiny 5Mb while these days 8Gb is the maximum hard disk capacity. The average PC bought today has at least 1 Gb in hard disk storage.

Data is recorded onto the magnetic surface of the hard disk in exactly the same way as it is on floppies or digital tapes. If you've ever defragmented your hard disk, you probably have some mental image of how the surface of the disk looks. It is treated as an array of dot positions each of which can be identified and set to a binary "1" or "0". The position of each array element is not identifiable in an "absolute" sense, and so a scheme of guidance marks helps the recorder find positions on the disk. The need for these guidance markings explains why disks have to be formatted before they can be used.

Hard disk speed

The speed of a hard disk can be measured in lots of ways, and it's important to know exactly what figures are being quoted when you're shopping for a new one. The performance of your hard disk is very important to the overall speed of the system. A slow hard disk will hinder a fast processor like nothing else in your system can.

As an initial gauge, look for the drive's "average access time". This is the time taken by the drive to locate the right track on which a piece of data is stored, and the specific place on the track where that data is sitting. This is usually quoted in milliseconds. As well as "average access time" look out for "transfer rates". The transfer rate is the speed at which the drive can deliver the data from the disk platters to the CPU. This is generally described in megabytes per second.

In order to get an accurate view of a hard drive's performance, the average access time and the transfer rate should be looked at together. Drive makers and dealers have a

reputation for bending the truth on such issues and are often found to quote the fast access time of a drive, without any mention of the transfer rate — you'll see this in advertisements. A high access time coupled with a slow transfer rate produces a slow drive.

Because access time is measured in milliseconds and transfer rate is measured in Mb per second, the overall drive performance can be difficult to get your head around. Basically, you're looking for the lowest access time and the highest transfer rate.

Another measure of hard disk performance is "seek time", conveniently confused (by some people) with the access time. Seek time is measured in milliseconds and defines the amount of time it takes a hard drive's read/write head to find the physical location of data on the disk. The "seek time" says nothing about the speed of a hard drive. The importance of the "access time" and "transfer rate" is that they tell you how long a hard drive takes to locate and retrieve data.

PCW Contacts

Eleanor Turton-Hill welcomes feedback and suggestions from readers. Email beginners@pcw.vnu.co.uk

No-nonsense Buyer's Guide

Buying a PC

The one universal rule is that PCs get cheaper, better and faster all the time. The result is that your state-of-the-art PC can become outdated and old-fashioned in a couple of years. It may still work perfectly well, but it probably won't run very fast and won't run the latest software. If you're just planning to do simple word processing, this may not matter. But we're assuming here that you want to buy a general-purpose multimedia PC that can play games, use CD-ROMs and run a range of modern software.

manufacturer offer guaranteed response times?

- Check the technical support. Is it free? Is it easy to contact?

- For home use, you'll probably want full multimedia capabilities to enable you to use CD-ROM games and edutainment products and play video clips. This should include at least a 16-bit SoundBlaster-compatible sound card and speakers.

- Think about ordering more memory. RAM prices are low at the moment but creeping up — you can pick up 16Mb of EDO RAM for around £100 or less

Upgrading memory to 32Mb is also the quickest way to improve the performance of your machine — often more so than upgrading your processor.

- Look at the software bundle. If you want an office suite, it is far cheaper to buy it as part of the bundle. Larger manufacturers can offer MS Office, for example, at about one third of the recommended retail price. Multimedia CD-ROM bundles will not include the UK version of Encarta 96 — Microsoft only allows the US version to be bundled.

Other things to consider

PCs have become similar in the last few years. The days when smallish computer companies designed their own chipsets (the chips that assist the computer's main processor) are long gone. Most small box-shifters buy their motherboards from Taiwanese manufacturers. Larger companies either design motherboards themselves (Apricot, Compaq, IBM) or get motherboards built by other companies to their specifications (Gateway).

Cyrix chips are worth considering. Their 6x86 chips, such as the P133+, are often cheaper and give better performance than their Intel counterparts.

If you are serious about multimedia, it may be worth upgrading your sound card to a 16-bit wavetable card. A six-speed CD-ROM drive will give you a noticeable performance gain over a quad-speed, but the speed increase of an eight-speed over a six-speed is less tangible. Remember that, unlike your hi-fi setup, good speakers are powered from the mains, not from your PC.

For up-to-date PC reviews, see our cover story, this issue.

•PCW Second-hand specification

Buying second-hand or discontinued kit is the cheapest way to get started. This is the minimum spec we think you should go choose for general business use, playing games and accessing the internet.

- Windows 3.1 or 3.11
- DX2 66MHz 486 processor
- 8Mb RAM
- Graphics card with 512Kb of memory
- 200Mb hard disk
- 3.5in floppy disk
- CD-ROM drive
- 14in colour monitor

•PCW Minimum specification

This is the absolute minimum spec we think you should consider if you're buying a new PC. Suitable for general business use: word processing, databases and spreadsheets and, with a modem, accessing the internet.

- Windows 95
- 100MHz Pentium processor
- 16Mb RAM
- Graphics card with 1Mb of memory
- 810Mb hard disk
- Quad-speed CD-ROM drive
- 14in colour monitor
- PCI local bus

•PCW Recommended specification

If you're not strapped for cash, this is the specification we recommend. No-one at PCW would settle for less.

- Windows 95 or Windows NT 4.0
- Pentium or equivalent 133MHz processor (a fast processor will make your computer run quicker and more smoothly)
- 256Kb secondary cache
- 32Mb EDO RAM.
- Graphics card with 2Mb of memory
- 2Gb hard disk — modern computer software takes up a lot of space
- Six-speed CD-ROM drive (video clips will play more smoothly and you will be able to access files on CD-ROM disks more quickly)
- 15in colour monitor
- 16-bit SoundBlaster-compatible sound card

•PCW Best specification

This is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need even more memory, a bigger hard disk, a more powerful graphics card, or a larger monitor.

- Windows 95 or Windows NT4.0
- Pentium 200MHz MMX or Pentium Pro
- 512Kb secondary cache
- 32Mb EDO memory
- 4Gb hard disk
- Eight-speed CD-ROM drive
- 17in colour monitor
- 4Mb VRAM or WRAM graphics card (this means your graphics card can display more colours and at a higher resolution on your monitor: 16 million colours at a resolution of up to 1,280 x 1,024)
- 16-bit wavetable sound card

* We assume that any new PC has PCI local bus and a 3.5in floppy disk drive.

Buying a Notebook



Notebooks are one area in which it's often safer to stick to brand names. Not that some of the Far Eastern kit doesn't work perfectly well, but reliability seems to be a problem and it can be fiendishly difficult to obtain spares. A useful guideline when choosing a notebook is: try before you buy.

Remember that standard notebook specifications are generally a step or two behind the desktop equivalents.

What to look for in a notebook

- **Pointing device** There's been a wholesale move from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled using one finger).

- **CD-ROM drives** These are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.

- **Floppy disk drive** Often there's a choice between a CD-ROM drive and a floppy disk drive. If the notebook is to be your only machine, make sure the CD-ROM drive and floppy can be used simultaneously.

- **PC Cards** Modern notebooks all have at least one PC Card slot. They take credit-card-sized expansion cards which add a fax-modem, a network interface card or even an extra hard disk to your computer.

- **Battery life** Battery life varies from as little as 30 minutes to over six hours. Lithium Ion and Nickel Metal Hydride batteries have now replaced the older NiCad (Nickel Cadmium) batteries.

- **TFT screens** TFT or active matrix screens are replacing the slower dual-scan or passive matrix screens. It means the screen image is refreshed far more quickly.

- **Warranty** Drop a notebook and it may break, so it is vital to check the terms of your warranty. How long is it? What level of service is provided?

•PCW Minimum specification

Notebooks change quickly. It's possible to pick up end-of-line machines with Pentium processors from brand-name manufacturers like Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use.

•PCW Recommended specification

- Windows 95
- Pentium
- Quad or six-speed CD-ROM drive
- 256Kb secondary cache
- 16Mb RAM
- On-board graphics with 1Mb of memory, PCI local bus
- 850Mb hard disk, 3.5in floppy disk drive and/or dual-speed CD-ROM drive
- TFT 800 x 600 screen

•PCW Best specification

The state-of-the-art notebook: either you're loaded, or your company's picking up the tab.

- Windows 95 or Windows NT
- Pentium
- 256Kb secondary cache
- 32Mb RAM
- On-board graphics with 2Mb of VRAM memory, PCI local bus
- 1.2Gb hard disk
- 3.5in floppy disk drive
- Eight-speed CD-ROM drive
- Active matrix 1,024 x 768 TFT screen
- Long battery life

Buying Don'ts

- Don't buy a machine with less than 16Mb of memory if you plan to run Windows 95.
- Avoid cheap 14in monitors.
- Bundled 14.4kb/sec modems are not the bargain they seem. Opt for 28.8kb/sec or one of the new 33.6kb/sec modems when they become available.

Buying Do's

- You can never have too much disk space. Spend extra cash on buying the next largest hard disk size.
- Make sure Pentium motherboards have an Intel Triton chipset; either 430HX or 430VX.
- Check the warranty. Is it for on-site or back-to-base repairs? If it's on-site, does the

Glossary

of computing terms

A

Access time

The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Applications

An application, or package, is one or more programs used for a particular task. For example: word processing, invoicing or spreadsheeting. Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for specific uses.

ASCII (American Standard Code for Information Interchange)

Usually a synonym for plain text without any formatting (like italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary in order for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B

Backwards compatible

Compatibility of hardware or software to older versions of the product or standard.

Baud rate

The amount of data that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V* and Bit).

BIOS

Basic Input/Output System. Software routines that let your computer address other devices like the keyboard, monitor and disk drives.

Bit

Binary digit, the basic binary unit for storing data. It can either be 0 or 1. A Kilobit (Kbit) is 2^{10} (1,024 bits); and a Megabit is 2^{20} , which is just over a million bits. These units are often used for data transmission. For data storage, Megabytes are more generally used. A Megabyte (Mb) is 1,024 kilobytes (Kb) and a Kb is 1,024 bytes. A Gigabyte (Gb) is 1,024Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot

Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press Ctrl+Alt+Del) or a cold reboot, where you switch the computer off and back on again.

Bus

A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST

Cache On A Stick.

CD-ROM

A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the

CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data — equivalent to some 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, yet this makes them ideal for archiving.

CISC (See RISC)

CPU

Central processing unit. Normally refers to the main processor or chip inside a PC. (See Processor).

Crash

Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software), or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)

Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)

Common measure of the resolution on a printer, a scanner or a display.

Drive controller card

An expansion card that interprets commands between the processor and the disk drives.

Drivers

Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)

A bus standard designed to compete with MCA. Now being replaced by PCI.

Electronic mail (E-mail, email)

Still the biggest single use of the internet. When you sign up with an ISP you are given an email address. Usually you can incorporate your name, or part of it, into your email address to make it easy to remember.

Expansion card

Circuit boards that fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external version (which is more common) but

sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F

Floppy disk drive

Practically all PCs come with a floppy disk drive. 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy, 5.25in disks.

Fonts

A font is an alphabet designed in a particular style. Fonts apply to both screen and printed letters. TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format

To wipe a floppy or hard disk in order to prepare it to accept data.

G

GPF

General protection fault.

Graphics card

An expansion card that interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)

(See Windows)

H

Hard disk

Sometimes called a fixed disk, hard disks are hermetically-sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb but disks of up to 9Gb are available.

Hardware

All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)

The standard language used in the creation of web pages, which can be read by web browsers.

I

IBM-compatible

Originally meant any PC compatible with DOS. Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

IDE

Integrated drive electronics. A

control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features.

Internet

Millions of computers interconnected in a global network.

Internet Service Provider

ISPs provide access to the internet. You use your modem to dial the ISP's modem. The ISP has a high-bandwidth permanent connection to the internet.

IRDA

Infra-Red Data Association — the standard for exchanging data using infra-red, typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)

This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it is still in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI).

ISDN (Integrated Services Digital Network)

A digital voice and data telephone network which looks set to replace the current analogue version. ISDN adaptors are already starting to replace modems as a fast way of accessing the internet and transferring data.

J

JPEG (See MPEG)

K

Kbit (kilobit), Kb (kilobyte)

(See Bit)

L

LAN (Local Area Network)

(See Network)

Local Bus

PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it replaces.

M

Macintosh (Mac)

A personal computer made by Apple and which is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows, but pre-dates it and (in some people's view) looks and works much better.

Maths co-processor

A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See Bit)

Mb (megabyte) (See Bit)

MCA

A type of bus designed by IBM to beat EISA. Although faster, it never became popular because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)

A standard for compressing video available in several flavours: MPEG 1, MPEG 2, MPEG 4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory

The term normally refers to RAM (Random Access Memory). This is the kind that disappears when you turn off your computer and is much faster to access than a hard disk. It acts as a staging post between your computer's hard disk and its main processor.

• DRAM (Dynamic Random Access Memory) This requires its contents to be replaced every

1/1000th of a second and is the most common form of memory in PCs.

• SRAM (StaticRAM) Retains memory until the power is switched off.

• VRAM (VideoRAM) Faster than DRAM, this is used by graphics cards.

• EDO (Extended Data Out RAM) The latest type of memory. Offers improved performance.

• Cache memory Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of in-built cache. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is often used to cache your hard disk.

• ROM (Read-Only Memory) A type of memory which can only be read: you can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, such as the information the computer requires when you start it up.

MMX (Multimedia extensions)

(See Pentium)

Modem

The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers.

Monitor

Your computer's screen. Signals are sent to it from the video card.

Motherboard

The main printed circuit board which houses processor, memory and other components.

N

Network

A network is a group of computers linked together with cable. The most common form is a LAN (Local Area Network), where electronic mail and other files can be exchanged between

users without swapping floppy disks. Printers and other resources can be shared. All the PCs on a LAN are connected to one server, which is a powerful PC with a large hard disk that can be shared by everyone.

O

OS (Operating System)

The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P

PC Card

Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit-card sized cards.

PDA (Personal Digital Assistant)

Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local bus)

PCMCIA (See PC cards)

Package (See Application)

Parallel ports

Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pentium

Fast 32-bit processor with a built-in 16Kb cache. Now the standard on PCs. It is about to be replaced by the Pentium MMX chip which has extra instructions and a 32Kb cache. The Pentium Pro is a higher end workstation CPU with 256Kb cache meant for full 32-bit operating systems such as Windows NT.

Pixel

Picture element. The smallest addressable dot displayed on a monitor.

PowerPC

This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor

The chip that does most of a computer's work.

Programs (See Applications)

Public domain

Software that is absolutely free. The author usually retains copyright but you can make as many copies as you want and pass them to other people. Often confused with shareware.

Q

QWERTY

The name of a standard English-language keyboard, derived from the first six letters in the top row. The French equivalent is AZERTY.

R

RAM (Random Access Memory)

(See Memory)

Reboot

(see Boot)

RISC (Reduced Instruction Set Computing)

These are starting to replace CISC (Complex Instruction Set Computing), as they're usually faster. The PowerPC chip is a typical example.

ROM (Read Only Memory)

(See Memory)

RTF (Rich Text Format) (See ASCII)

S

SCSI

Small Computer System Interface is a bus that comes as standard in a Macintosh and is starting to rival EIDE on PCs.

Serial port

Serial ports (com1 and com2) are used by your PC to communicate with the outside world. Serial ports are mostly used by modems and similar devices which communicate quite slowly. Faster communications are achieved via the parallel port.

Shareware

A method of distributing software. It is freely available, but not free-of-charge. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.

SIMM (Single Inline Memory Module)

The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities up to 16Mb.

T

Tape streamer

Magnetic tape recorder designed for backing up data from your hard disk.

U/V

UART (Universal Asynchronous Receiver Transmitter)

Pronounced "you-art". A chip that allows your PC to cope with high-speed communications.

How to choose an ISP

There are now over 100 Internet Service Providers,

which makes selecting the right one a difficult task. Competition between them is now so fierce that many Providers are happy to offer a month's free trial.

All ISPs (Information Service Providers) allow you to send and receive internet email, browse the web and download files from internet servers. But there are differences between the extra services that each provides.

Large, centralised, online services like AOL and CompuServe offer discussion areas and specialised content like online magazines, and searchable file libraries and are easy to use. However they are not the fastest way of accessing the World Wide Web.

Some ISPs charge a flat-rate for internet access while others charge extra if you exceed a specified number of hours online.

The quality of the software and technical support provided also varies. In general, the big "consumer" ISPs offer better support and more commercial software. The smaller, more basic, operations often offer cheaper deals.

Some ISPs are more geared up to business users who may need a fast ISDN connection and/or require the service provider to host or even design web pages for them.

Your chosen ISP can have a big effect on the performance of your internet connection, particularly access speed to US site. Relatively few ISPs provide local call access to anywhere in the UK. In London you'll have plenty of

choice, but in the west of Scotland, say, the choice will be limited.

•PCW Recommended products

Big, commercial ISPs are not cheap, but are easy to use, with plenty of extra services thrown in: **CompuServe 0800 289378; AOL 0171 385 9404**

Barebones service which is not for beginners but it does make your PC a full internet node in its own right: **Demon 0181 371 1000**

Another established service provider worth considering: **Easynet 0171 209 0990**

Buying a Printer

There are two main types of printer: laser and inkjet.

Lasers

Most office printers are lasers. They work much like photocopiers, and are cheap to run and print quickly. The disadvantage is the higher initial cost and mono output. Laser printers are available in all sizes and at all prices. Small desktop printers cost as little as £300. You can buy colour laser printers but they are still expensive, typically £5,000 or more.

Types of laser

PCs print by sending a description of the page to be printed down a printer cable. There are three commonly-used page description languages (PDLs):

• PostScript

This sends an outline in vector form (see *Drawing Software*) to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so the image looks the same on a monitor (75dpi), a laser printer (300dpi) and professional image-setter (2,400dpi).

• PCL

This stands for Printer Control Language, and it is Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers. Printers using this tend to be cheaper than PostScript ones but output will vary from one machine to another, making it less suited to professional use.

• GDI (graphical device interface)

These printers download the description of your page already used by Windows straight to your printer. They only work with Windows but are cheap and fast. They are only suitable for a personal printer and will not work across a network.

•PCW Recommended products

- **Cheap lasers** Epson EPL-5500: **Epson 0800 220546**; street price £300 (see *PCW* February 1996)
- **Sub-£750 lasers** Hewlett-Packard 5P: **Hewlett-Packard 01344 369222** (see *PCW* November 1995)
- **Network lasers** Hewlett-Packard 5P: **Hewlett-Packard 01344 369222** (see *PCW* February 1996)

Inkjets

Inkjets work by spraying ink onto paper. There are still some mono inkjet printers available, but it is best to stick with a colour inkjet printer as the price difference is negligible. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good quality colour, especially on high-resolution paper.

•PCW Recommended products

H-P Deskjet 870CXi: **H-P 0990 474747**; street price £311.

Lexmark 2070: **Lexmark 01628 481500**; street price £280. (See *PCW* November 1996).



Hybrids

For home use and small offices, a hybrid could be the answer. They combine a printer, a fax machine and copying capability in one unit.

•PCW Recommended products

Brother HL 730: **Brother 0161 330 6531**. £270.
Sharp JX 9210: **Sharp 01753 819819**. £209.
(see *PCW* January 1997)

Buying a Scanner



Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

Flatbed scanners

The most common type, costing from £300 to over £3,000. They are capable of scanning colour pictures to a high standard. Most have transparency adaptors as optional extras.

Document scanners

A new category which aims to combine the reliability of flatbeds with speed and portability. They're intended for OCR and document management. Most will cope with photographs and some with colour, but it's not their forte.

•PCW Recommended products

Flatbed scanners

- Professional — Arcus II: **Agfa 0181 231 4200**; street price £2,600.
- Intermediate — Epson GTX 9000: **Epson UK 01442 61144**; street price £750.
- Budget — Umax Vista S6E: **IMC 01344 872800**; street price £299 (*PCW*, Sept 1996).

•PCW Recommended products

Document scanners

Visioneer PaperPort VX: **Computers Unlimited 0181 200 8282**; street price £299.
Logitech PageScan Colour: **Logitech 01344 894300**; street price £299.
Plustek PageReader 800: **Scan Direct 01292 671676**; street price £149 (*PCW*, March 1996).



Buying a Fax Modem

You'll need a modem to connect to the internet or an online service, such as CompuServe or AOL, and also to send and receive email.

Modems are available in three formats: as PC cards to plug into notebooks, as external boxes and as expansion cards. PC card modems cost the most and external modems cost slightly more than expansion cards.

Apart from the case and the external power supply, there's often little difference between the internal and external versions of a modem. Most modems now have built-in fax capability, which means you can receive faxes on your PC to view or print out. If you're strapped for cash, a V32bis 14.4kb/sec modem is just about adequate, although

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better to buy a V34 28.8kb/sec modem or one of the new V34 Plus 33.6kb/sec modems.

•PCW Recommended products

Fax modems

- External — Hayes Accura 288 Message Modem **Hayes 01252 775 577** street price £145. (see PCW November 1996, December 1996).

Buying a CD-ROM Drive

Just about the only things which vary on today's CD-ROM drives are their speed and means of connection. The most common connection is IDE or Enhanced IDE (EIDE). It is possible to connect an IDE CD-ROM drive to most existing IDE hard disk controllers. Older PCs may need a newer EIDE controller. IDE controllers are also found on many soundcards.

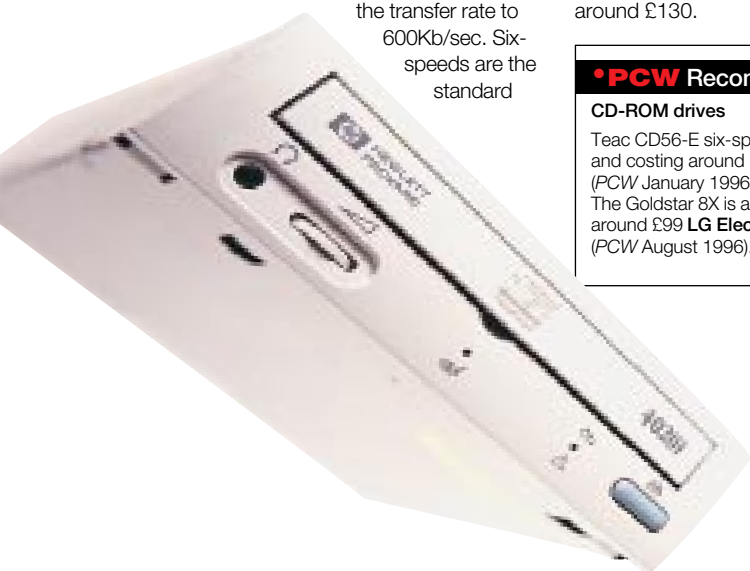
The first CD-ROM drives spun the disc at the same speed as an audio CD and were called single-speed, delivering a sustained data transfer rate of 150Kb/sec. Double-speed drives spun twice as fast, doubling the data transfer to 300Kb/sec, and quad-speeds twice as fast again, raising the transfer rate to 600Kb/sec. Six-speeds are the standard

(900Kb/sec), with eight-speeds (1,200Kb/sec) becoming increasingly common. All figures are theoretical maximums. Buyers should go for quad-speed or higher. There is little to choose between models, but off-the-shelf supplies are frequently short. Internal IDE quads start at around £100 and six-speeds around £130.

•PCW Recommended products

CD-ROM drives

- Teac CD56-E six-speed: fitted to many new PCs and costing around £85 **Teac 01923 225235** (PCW January 1996).
- The Goldstar BX is a good eight-speed choice for around £99 **LG Electronics 01753 691 888** (PCW August 1996).



Glossary

(contd. from p339)

V34 Plus, V34, V32bis

A series of CCITT standards that defines modem operations and error correction. There are more than 20, but the key ones are:

- **V32.bis**, the standard for 14.4kb/sec modems.
- **V34**, the standard for 28.8kb/sec modems (see Baud).
- **V34 Plus**, the new standard for speeds up to 33.6kb/sec.

VESA (See Local Bus)

VGA

Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.

VL-Bus (See Local Bus)

VRAM (See Memory)

W

Windows

A GUI (Graphical User Interface) developed by Microsoft. Windows is supposed to make programs easier to use by giving them a standard, mouse-driven interface.

- **Windows 3.11** 16-bit operating system.
- **Windows NT** Robust, fully 32-bit operating system. Currently has the Windows 3.11 interface, but will soon be available with the Windows 95 interface.
- **Windows 95** Major improvement to Windows 3.11, with a redesigned interface. Less prone to crashes and easier to use, but requires more memory.

Winsock

Short for "sockets for Windows". The Winsock.dll is an extension for Windows which is necessary for connecting to TCP/IP networks.

World wide web

A service on the internet which uses special software called web browsers (Netscape and Internet Explorer are the two best-known ones) to give you access to pages of information with text, pictures and multimedia.

WYSIWYG

An acronym for What You See Is What You Get. What you see on the screen is exactly what you get when you print out your work.

Z

ZIF (Zero Insertion Force)

Sockets used for large CPUs. Lifting a handle enables you to remove the processor.

ZIP

The common standard for compressing files so that they take up less space. Zipped files have the extension .zip and are compressed and decompressed using shareware utilities such as Winzip and PKZIP.

Buying a Graphics Card



The graphics card sits inside the PC and controls the features which the software can display on the monitor.

Check the amount of memory on the card. 2Mb is standard these days, 1Mb is skimpy and 512Kb is barely usable. Better-

quality cards are likely to be fitted with VRAM (Video RAM). Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and even 128-bit: all you need to know is that a large number of bits means faster performance and more colours.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz.

A 2Mb card can display 16-bit colour (65,000 colours) at 1,024 x 768 pixels. A 1Mb card can only manage 8-bit colour (256 colours) at 1,024 x 768 pixels. To display 24-bit colour (16 million colours) at 1,024 x 768 you'll need 4Mb of memory.

The refresh rate (measured in hertz) is important, too. It represents the number of frames displayed on-screen per second. A flickering display is very tiring to use.

Finally, find out whether your video card is "local bus" or not. Local

bus is a type of interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU which makes it a lot faster than the standard ISA interface.

•PCW Recommended products

Graphics cards

- ATI Video Xpression: **ATI Technologies 01235 833666**; around £175 (see Graphics Card group test, PCW June 1996)
- Matrox Millennium: **Matrox 01793 441144** £150
- VideoLogic GrafixStar 600: **VideoLogic 01923 260511** from about £150

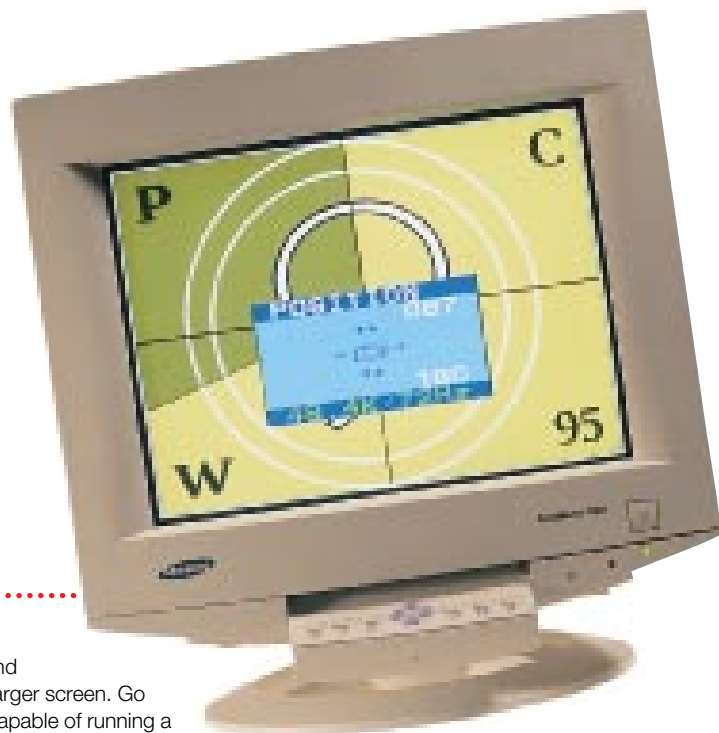
Buying a Monitor

Regardless of your computer application, you'll be looking at your monitor all day, so make sure you get a good one.

Some people claim not to see monitor flicker, but your brain does, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors.

Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes. The resolution refers to the number of dots (pixels) horizontally and vertically on-screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The more pixels, the more you'll be able to fit on screen, but

everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 x 768 non-interlaced at 70Hz or higher. The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in screen may only have a 14.5in visible area, and a 17in may have only 16in visible.



•PCW Recommended products

- For a 15in screen: try the CTX 1569MS (around £300) or the NEC M500 multimedia **CTX 01923 818461 NEC 0181 993 8111** (around £410 on the street).
- At 17ins there's the Sony 17sfl or the Taxan Ergovision 730TCCO-S at around £500 **Taxan 01344 484646** (PCW July 1996).



Buying a Sound Card

You need one of these to add sound capability to your PC.

Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44KHz provide higher-quality sound than slower 8-bit cards. Better sound cards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable. The newer cards are also plug and play which

means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

•PCW Recommended products

- AWE-32: **Creative Labs 01245 265265**; £199 (PCW, April 1996).
- Aztech SoundGalaxy Waverider Pro: **Aztech 01734 814121**; £79 (PCW, April 1996).

Buying Software

Only a few years ago there were dozens of different software applications in each category. During the last two years or so, however, there has been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and not worth considering. We've distilled each category down to just one or two recommended products.

Software A-Z

A ■ **ACCOUNTS SOFTWARE** One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS. **Recommended products:** Lakeview LMS and Exchequer from SBS Systems.

B ■ **BROWSER** Programs used to navigate the internet. A modern browser lets you navigate web pages, download files and send and receive email. **Recommended products:** There are only two worth talking about: Netscape Navigator and MS Internet Explorer.

C ■ **CAD SOFTWARE** Computer Aided Design covers everything from architectural drawings through office planning to complex engineering drawings. **Recommended products:** AutoCAD is the industry standard but we think MicroStation 95 is a more capable product at the high end. At the cheap end, DesignCAD 3D offers astonishing value for money.

■ **CONTACT MANAGERS** (see PIMs)

D ■ **DATABASE** At its simplest, an electronic card index. For just a few hundred names and addresses, an electronic-type Filofax such as Lotus Organizer may be more appropriate. But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite

applications. In most offices you are likely to use a database application that somebody else has written for you.

Recommended products: Lotus Approach, Microsoft Access.

■ **DESKTOP PUBLISHING SOFTWARE (DTP)** This is software used to create newsletters, magazines, books, brochures or adverts.

Typically, it allows you to incorporate graphics, lay out text in multiple columns and to run text around graphics. You also have control over how text appears including the leading (pronounced ledding) which is the space between lines of text and kerning, which is the space between individual letters.

Recommended products: The high-end market leader is Quark Xpress on Macintosh. On the PC, Pagemaker is strong. For serious work on a budget we recommend Serif Publishing Suite and for sheer ease-of-use Microsoft Publisher.

■ **DRAWING SOFTWARE** Programs for drawing, that work using vectors. This means each shape drawn is described using mathematical equations. **Recommended products:** At the budget end, GSP Designworks 3 stands out. At the professional end of things, FreeHand 5 gets our plaudits.

I ■ **IMAGE EDITING SOFTWARE** A program for editing bitmap files (files made up of pixels). Typically used for converting graphics files, retouching photographs and preparing pictures for printing. **Recommended products:** For simple image editing the popular shareware program Paintshop Pro is fine. For professionals, Adobe's Photoshop is the industry standard.

■ **INTEGRATED PACKAGES** Typically these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another, but integrated packages tend to lack some of the advanced features of individual applications. **Recommended product:** Microsoft Works.

■ **MULTIMEDIA AUTHORING TOOLS** Programs designed for producing interactive multimedia applications, typically for training applications or for CD-ROMs. The software lets you control and manipulate different types of media like sound files, audio files, video clips and graphic files. **Recommended product:** Macromedia Director, the product used to produce PCW's cover-mounted CD-ROM, gets our vote.

O ■ **OCR SOFTWARE** Optical Character Recognition software converts printed text into computer text you can edit. You will also need a scanner or fax card to get the printed text onto your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems. **Recommended products:** Omnipage is the best product we have found, but TextBridge offers most of the same capabilities for less cash.

P ■ **PERSONAL INFORMATION MANAGERS (PIMs)** PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients. **Recommended products:**

Sidekick 95 and Organizer are excellent PIMs. For contact managers we recommend Goldmine for Windows.

■ **PRESENTATION GRAPHICS** Increasingly the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides and support for video clips. **Recommended products:** Powerpoint and FreeHand are both capable products sold with Microsoft Office and SmartSuite respectively.

■ **PROGRAMMING TOOLS** Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which, although much easier to use, generally sacrifice performance and flexibility in the process.

Commercial programs like Word for Windows are written using low level languages. Bespoke applications and prototypes are often written using Delphi or Visual Basic. **Recommended products:** Delphi 2.0 is a great example of scalability, catering for beginners and serious developers working on major projects. Visual C++ is the pick of the high-end Windows development tools.

■ **PERSONAL FINANCE PACKAGES** These help you manage home finances. They're also well-suited to some small businesses and tend to be easier to use than full-blown accounts packages. **Recommended product:** Quicken is the outstanding product in this category and has no serious rivals.

■ **PROJECT MANAGEMENT** Programs for managing large projects. Anything from building a

power station to planning a marketing campaign. **Recommended products:** SuperProject 4.0 for Windows

R ■ **REMOTE CONTROL SOFTWARE** Software which lets you access and control a PC remotely, usually by using a modem. **Recommended products:** ReachOut, for its simple interface and support for different networks, particularly TCP/IP.

S ■ **SPREADSHEET** An electronic version of an old-fashioned ledger. Excellent graphing and charting facilities are included nowadays. **Recommended products:** Lotus 1-2-3, Microsoft Excel. ■ **SUITES** Most general business software

(word processors, spreadsheets, presentation graphics packages) is now sold in suites.

Two suites are widely available: Lotus SmartSuite and Microsoft Office. Lotus SmartSuite also contains a database.

For Microsoft Office, you pay extra for Office Professional which contains Microsoft's Access database.

Recommended product: Microsoft Office is close to the industry standard. Its high level of integration gives it the edge over the opposition.

V ■ **VISUAL PROGRAMMING** (see Programming Tools).

W ■ **WEB EDITORS** Programs designed to do for web page design what DTP did for magazines and newsletters. They allow you to create web

pages without manually writing HTML. You can also incorporate graphics, backgrounds, tables, images and sounds into web pages. **Recommended products:** HotMetal Pro 3.0 is our first choice. Adobe Pagemill is a capable alternative.

■ **WORD PROCESSOR** An application in which you can write letters and prepare reports, or even produce a simple newsletter. The latest word processors have advanced features such as outliners, table editors and facilities for adding columns of figures. **Recommended products:** Microsoft Word is the clear market leader. WordPro (formerly AmiPro) is a capable alternative.

■ *If you want to get hold of any of the reviews listed above and don't have the original issues, order PCW on CD-ROM. It costs just £9.95. Full details on page 545.*

A-Z of Recommended Software Products

	Category	Product	Supplier	Contact	Price (plus. VAT)	Date of PCW review
A	Accounts	Lakeview LM3	Lakeview Computers	0181 303 3329	£8,750	Jan 1996
	Accounts	Exchequer	SBS Financial Systems	01202 298008	£5,980	Jan 1996
B	Browsers	Netscape Navigator	Netscape			
	Browsers	Internet Explorer	Microsoft	01734 270 001	Free	
C	CAD	Microstation	Bentley	001344 412 233	£3,495	Jan 1997
	CAD	DesignCAD 3D	BVG	01874 611 633	£149.95	Jan 1997
D	Database	Approach	Lotus	01784 455445	£99	Nov 1996
	Database	Access	Microsoft	01734 270001	£220	Nov 1996
	Desktop Publishing	XPress 3.3	Quark	01483 454 397	£795	Apr 1996
	Desktop Publishing	Publisher	Microsoft	01734 270 000	£70	Apr 1996
	Desktop Publishing	Publishing Suite 3.07	Serif	0115 942 1502	£99	Apr 1996
	Drawing	Freehand 5	MacroMedia	01344 761111	£450	Apr 1996
I	Drawing	Designworks 3	GSP	01480 496789	£39.95	Apr 1996
	Image Editing	Photoshop	Adobe	0181 606 4000	£382	Dec 1996
	Image Editing	Paintshop Pro	Digital Workshop	01295 258335	£49.95	Jun 1995
	Integrated Package	Works	Microsoft	01734 270001	£79.99	Oct 1995
M	Multimedia Authoring	Director 5.0	Macromedia	0181 200 8282	£99	Oct 1996
O	OCR	Omnipage	Caere	0171 630 5586	£595	Nov 1995
	OCR	Textbridge	Xerox Imaging Systems	01734 668421	£349	Nov 1995
P	Personal Finance	Quicken	Intuit	0800 585058	£39.95 (incl VAT)	May 1996
	PIM/contact manager	Organizer 2.1	Lotus	01784 455445	£99	Mar 1996
	PIM/contact manager	Goldmine for Windows	Elan Software	0171 454 1790	£395	Mar 1996
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Mar 1996
	Presentation graphics	Freelance	Lotus	01784 455445	£415	Nov 1996
	Presentation graphics	Powerpoint	Microsoft	01734 270001	£220	Nov 1996
R	Programming tools	Visual C++	Microsoft	01734 270001	£379	Feb 1996
	Programming tools	Delphi 2.0	Borland	01734 320022	£249	Feb 1996
	Project Management	SuperProject 4.0	Computer Associates	01753 679679	£495	May 1996
	Remote Control	Reachout	Stac Electronics	01483 740763	£110	Nov 1995
S	Spreadsheet	Excel	Microsoft	01734 270001	£220	May 1995
	Spreadsheet	1-2-3	Lotus	01784 455445	£365	May 1995
	Suite	Office (Standard)	Microsoft	01734 270001	£360	Mar/Dec 1996
	Suite	Office (Professional)	Microsoft	01734 270001	£460	Mar/Dec 1996
W	Web Authoring	HotMetal Pro	SoftQuad	0181 236 1001	£99	Oct 1996
	Web Authoring	Pagemill 2.0	Adobe	0181 606 4000	£??	Oct 1996
	Word Processing	Word	Microsoft	01734 270001	£220	Oct 1996
	Word Processing	WordPro (AmiPro)	Lotus	01784 455445	£99	Oct 1996

News

Barbie conquers all

The power of Barbie has vanquished all PC CD-ROM games and interactive products over the Christmas season, including the top-selling game Command and Conquer: Red Alert.

In a single month leading up to Christmas, Barbie Fashion Designer, from Mattel Media, sold over 200,000 copies in the US and sales are now approaching the 500,000 mark.

In the UK, Barbie Fashion Designer sold out completely, having been distributed to over 300 Woolworth stores as well as other major retail outlets such as Toys R Us, and Mattel hopes UK sales will be comparable to US sales on a pro rata basis.

In contrast, Red Alert sold a record-

breaking (for a game) 82,000 units in the UK, having been in the charts for only six weeks. But it didn't sell out.

According to one industry source, Barbie is one of the "hottest" items on the shelf today and it looks like we'll be seeing more of her in 1997.

■ Barbie Fashion Designer

£34.99 (incl. VAT)

JM Interactive

01703 650759

■ Command and Conquer: Red Alert

£39.99 (incl. VAT)

Virgin

0171 368 2255



Star Trek: Starfleet Academy

You will soon be able to warp to the future with Interplay's Star Trek: Starfleet Academy. Those who have dreamed of being part of The Federation can sign up with Starfleet and train to be an officer of the USS Enterprise.

Life won't be easy, though. You'll have to pass 27 simulation missions and navigate through Academy politics and sub-plots before you can graduate.

Once you have graduated, you can command the old Enterprise against arch

enemies: from a cloaked Klingon bird of prey to a Romulan heavy cruiser, all rendered in 3D graphics. Interplay expects to release the game by March.

■ Interplay 01628 423666



Now you can take the bridge of the starship, USS Enterprise

Charts			
LEVELUP			
1	Die Hard Trilogy	EA	PlayStation
2	Tomb Raider	Eidos	PlayStation
3	Diablo	Zabrac	PC CD-ROM
4	Victory Boxing	Virgin	PlayStation
5	Command & Conquer: Red Alert	Virgin	PC CD-ROM
6	Tomb Raider	Eidos	PC CD-ROM
7	FIFA '97	EA	PlayStation
8	Command & Conquer	Virgin	PlayStation
9	Secret of Monkey Island 1&2 White Label	Virgin	PC CD-ROM
10	Tekken 2	Namco	PlayStation
11	Dark Forces: White Label	Virgin	PC CD-ROM
12	Duke Nuke 'em 3D: Plutonium Pack	GT Interactive	PC CD-ROM
13	Championship Manager 2: Double Pack	Eidos	PC CD-ROM
14	Sega Ages	Sega	Saturn
15	Formula 1	Psygnosis	PlayStation
16	Crash Bandicoot	Sony	PlayStation
17	Privateer 2: The Darkening	EA	PC CD-ROM
18	Broken Sword	Sony	PlayStation
19	FIFA '97	EA	PC CD-ROM
20	WipeOut 2097	Psygnosis	PlayStation

Red Alert

Command and Conquer drops a smart bomb with its explosive history-changing sequel.



Red Alert: Ha-ha! Eat red death, you bourgeois imperialist pig-dogs....!

The original Command and Conquer was a huge hit, selling over one million copies and helping to make Red Alert the most eagerly awaited PC game for some time. Command and Conquer fans will love this.

In Red Alert's alternative history, World War II didn't happen, so now Stalin's evil Red forces are marching into Europe. Towns, cities and countries are being overrun by hordes of bloodthirsty Soviets.

You must choose whether you want to take the part of the namby-pamby goodies (a.k.a. the Allied Forces) and attempt to hold back the inexorable tide of evil Soviet attacks; or indulge your sadistic side by playing the USSR and bringing the glory of Stalinism to the rest of the world.

Visually the game is excellent with clear, detailed, graphics that are simple and intuitive to use. The level of difficulty builds

well, gradually introducing you to more advanced and complex features. There is a good mixture of missions: some are daring solo sorties across enemy lines, while others involve complex strategic scenarios where you control the production and deployment of armed units.

In addition to solo games against the computer, you can play with up to seven players on a network and even head-to-head against other individuals on the net, via the Westwood site. Battling on the net means a decrease in speed but not to the extent that the game becomes unplayable.

But enough of this soft imperialist pandering. I have two Yak aircraft to despatch on a mission, deep into Allied

territory: I'll catch them while they're trying on their Levis and listening to decadent rock music. They'll never know what hit 'em.

Adam Evans

PCW Details

Price £39.99 (incl. VAT)

Contact Virgin 0171 368 2255

System requirements Any Pentium processor, 8Mb RAM (16Mb recommended), 1Mb PCI graphics card, Win95-supported sound card, double-speed CD-ROM, 40Mb hard drive space, 28.8 modem for internet play, IPX network for LAN play.

★★★★

Sim Copter

Don't get carried away with war heroism and medals — do the donkey-work and earn dosh.



The appeal of simulation games has always been a bit beyond me. I've watched my friends get sucked into imaginary worlds, building up cities, nudging them out of the dark ages and into the industrial age, only to see them destroyed by a war-mongering neighbour.

But Sim Copter looks perfect for the dedicated sim fan. It can either be played using a city created in SimCity 2000, or you can choose a ready-made one.

If this is your first flying gig, check the tutorial. According to the manual this can be found in the main menu by clicking on Open User Game, but in the US version I reviewed, the tutorial was in New User Game. Let's hope Maxis doesn't repeat the same mistake for the UK edition.

Lose those idealistic notions about flying rescue missions to save lives: you're doing this for the money. To earn the dosh needed to buy bigger helicopters and a

No idealism required: just fly the big-wigs, quench fires and unruly mobs and earn loadsa money

tear-gas gun to quell unruly mobs, you have to put out fires and transport bigwigs around the city. And for these fat cats, time is money. Stop for an injured person, and they'll dock the lost time from your pay.

It doesn't take long to get the hang of this flying lark, but the hardest task I had was installing the game. DirectX messed up the drivers on the first PC I tried and the game crashed continuously after that. On a second PC things ran smoother, although error messages still interrupted gameplay. Re-starting the PC seemed to clear this, but who wants to do that all the time?

I'd have liked the action to be quicker as

there's often a long wait between call-outs. But it was fun passing the time flying under bridges and chasing traffic.

Lynley Oram

PCW Details

Price £29.99 (incl. VAT)

Contact Maxis 0171 505 1500

System requirements Pentium 75 or faster, 16Mb RAM, four-speed CD-ROM, mouse, SVGA graphics card with minimum of 512Kb video RAM. Supports all sound cards compatible with Windows 95 and DirectX-compatible joysticks.

★★

Versailles 1685

Unearth the palace plotters in this past-times poser of intrigue and conspiracy against Louis.

In 1685 Louis XIV was at the height of his reign. After years of instability, the squabbling French nobles had been forced into submission and the wars outside France were no longer draining the country's resources. But not all was peaceful. The palace at Versailles was rife with intrigue and conspiracy as the nobles vied for the King's favours or, more dangerously, plotted to topple him from the throne.

The game revolves around uncovering a plot against the King's life. Bontemps, the King's valet of the bedchamber (or PA, as he would probably be known today) has sent you off to discover if the rumours are true. You begin in the King's bedroom at the time of his *reveille*, or the grand ceremony surrounding the King's waking hours. You then walk around and explore the palace in 3D reality, stopping to look at the paintings on the wall or at the ornate

Palace pictures: the history of Versailles

ceilings, and to do a bit of sleuthing on the way. You will also find famous figures of the time, like Racine, hanging out in the anterooms.

Talk to them and begin to unravel the complex politics of the palace and discover clues to the mystery. There are pieces of physical evidence, too, stashed in hiding places around the rooms.

There is more to the game, however. The 3D walk-through of the palace can be taken without playing the game and is a good preparation for the game itself. There is a wealth of information about the palace, history, and politics of the time, the major characters and the culture of the court, all



helping you get to the bottom of the mystery. Altogether a fascinating package.

Adele Dyer

PCW Details

Price £39.95 (incl. VAT)

Contact Centresoft 0121 625 3399

System requirements 486 DX2/66, 8Mb RAM, 2Mb hard disk space, double-speed CD-ROM drive, 16-bit sound card.

★★★★

Chessmaster 5000

Pick your opponent, pick your music and settle down for a lesson or a head-to-head contest.

It is 1858 and you are sitting at a chess board. Listen to Mendelssohn's Overture as you wait for the young genius, Paul Morphy, to make the first move. Will you succeed where the masters of the day failed? No? Then let Bobby Fischer sit at your place, instead.

Chessmaster 5000 is something new in chess programs. It has enhanced 3D graphics, 60 grandmaster opponents, 30 classical musical accompaniments and many sound effects.

There are lots of original features, too, including 20 graded chess lessons (from beginner to expert), Natural Language Advice, Coach and Mentor modes (where legal moves, captures, threats and board control are highlighted), and Opening Practice. Additionally, there are 30 more



custom opponents from novice to championship standard, a 27,000 game database, an auto-annotator, internet connection and a phone helpline.

There is a good manual, controllable time limits, analogue or digital clock, opening books, online analysis, and storage of games. Installation from CD-ROM was straightforward but the program wouldn't run as it lacked a DPLAY.DLL file; so I

Play on this Salvador Dali-type boardscape

found DPLAYX.DLL and renamed it. There were some quirks in actual play. The program froze twice at intermediate level, and at the highest level the program is less strong than other conventionally-packaged programs; but then, these do cost twice as much.

I was impressed by Chessmaster 5000 and would recommend it to beginners. The teaching modes, lessons and database alone justify the purchase.

Keith Jackson

PCW Details

Price £44.95 (incl. VAT)

Contact Mindscape 01444 246333

System requirements Windows 95, 486DX2/66, 8Mb of RAM (16Mb recommended), 32Mb free hard disk space, double-speed CD-ROM, 256 colour display and optional sound card.

★★★★

Brainteasers

Quickie

A very old chestnut for this month's quickie. A brick weighs 7lbs plus half a brick. What is the weight of a brick and a half?

Prize Puzzle

Using four different two-digit prime numbers (leading zeros not permitted) and any of the symbols =, + (addition), - (subtraction), * (multiplication), / (division), generate an expression that approximates Pi to as many digits as possible. For example, you could use $Pi = (59+29) / (17 + 11) = 88/28 = 3.142$

which is accurate to two digits only, but I'm sure you can do better than that.

Remember, you must use exactly four different primes within the range 11 - 97. You may only use the operations of addition, subtraction, multiplication and division. In case of doubt, the first eight decimal places of Pi are 3.14159265. I doubt if anyone will achieve greater accuracy than that, but if they do, we'll manage to verify it, I'm sure.

Send your solution to PCW Prize Puzzle March 1997, P.O. Box 99, Harrogate HG2 0XJ, to arrive no later than 20th March 1997. Good Luck!

Winner of the December 1996 Prize Puzzle

The December issue problem about George buying stamps proved to be fairly easy. Almost all 140 entries arrived at the correct solution, made up of: 120 stamps at £1.20, 96 stamps at £0.96, 72 stamps at £0.72, giving a total of £288. The winning card, drawn at random, came from Ms Singh, of Handworth. Congratulations, Ms Singh, your prize will be with you shortly.

Meanwhile, to all the others — keep trying, you could be the next winner.

JJ Clessa

Computations

Reverse direction

Everything to do with computers is hyper-commercial. They have unleashed a new dimension of designed-in waste, and a licence to commercialise.

- Far from bringing diversity, software has produced the biggest commercial monopoly since Standard Oil.

- Far from spreading wealth, it has produced the USA's biggest personal fortune ever.

- Of the 200 digital TV channels to be offered, at least 100 are intended to be driven by mass-market advertising.

- The net is being speedily commercialised and will eventually be a full-blown sales market accessible by schoolchildren.

- Commerce is funding universities and developing materials for school computers.

- The BBC has been market-structured and its poll tax is to float upwards (with inflation) to match cable fees.

- Identity smartcards will give access to tax information and be readable, remotely, from within police cars.

- As public libraries go digital, they are increasingly charging fees.

- Nearly all nominally public cultural institutions are charging fees.

- Software will allow surveillance cameras to "recognise" undesirable persons.

These trends are the exact reverse of what could be facilitated by electronics, imaginatively applied.

Upside-down economics

The waste in computing is staggering: 100 million obsolete units are believed to be lying about. Plastics profligacy is partly to blame, stemming from fossil fuel delirium. Our economics are upside down. For instance, individuals on average earnings pay 30 percent tax and national insurance.

By contrast, companies which are emptying the UK of accessible oil and gas (source of plastics) at an accelerating rate pay only 6.5 percent on their gross profits; one-fifth of the personal rate. If companies paid the same rate as people, it would add £4bn a year to national revenue: more than three times the revenues from the Lottery.

With plastics properly valued as a result, further hundreds of millions would flow in from VAT, to finance recycling programmes.

- Source: (6.5p in the pound) Gross oil and gas production half-year profits: UK £6.584bn. Deductions allowed before

Taxation tinkle

Over the past five years, taxes raised on personal income were increased by 15 percent. In the same period, taxes raised on foreign multinationals (like the computer majors) and other corporations declined by 20 percent. If the 15 percent increase had been applied to corporations as well, the increase in personal taxes could have been halved, saving each individual taxpayer an average of £133.

- Source: CSO Financial Statistics No. 404

taxation: UK £5.952bn. Tax paid: UK £424m. Inland Revenue (June-Dec 94). Lottery contributions in latest year: £1.2bn.

Tip of the iceberg?

Nick Leeson was not just a demented settlements clerk with delusions of grandeur who found himself free of risk control. He was a computer fraudster.

In *The Collapse Of Barings*, Stephen Fay describes Leeson's fundamental deception: "A few days after the error account was opened, Leeson instructed Dr Wong, the [Singapore] computer-systems consultant retained by Barings, to change the software program. Wong's CONTAC system automatically reported daily to London four separate items on each account: trade file, price file, margin, and the 'London gross'." Wong was instructed to exclude three of these items on the 88888 account from the daily electronic report to London. All that was reported was the margin file. So when the daily margin file arrived in London, the automatic sorting system did not recognise the account number. For three long years this doctored software automatically operated its deceit about a thousand times. It was this fundamental stupidity and mechanical cretinism behind a computer screen that facilitated the greatest financial fraud in history. Are we glimpsing the tip of an enormous computer fraud iceberg?

Rowland Morgan

Plus and minus

The Plus 4 followed the Commodore 64 but, doomed to failure, it initiated the company's demise. Simon Rockman remembers.

The name "Plus 4" may sound more like a style of golf trousers than the future hope for home computing, but in 1984 it was the name Commodore chose for its successor to the astonishingly successful Commodore 64.

Well, it wasn't *quite* the chosen name. The original plan was to have a range of machines with three case and keyboard types and three memory sizes: 16K, 32K and 64K. The models would then have been called 116, 264 and 332. In a bid to copy car manufacturers, letters were added for various options which had been fitted. So the addition of a voice synthesiser made your PC a 264V. A 264S meant you had the optional built-in software. The top-of-the-range model was a 364SV.

Then Amstrad announced the CPC464, a name which has never been confirmed as having been aimed at Commodore, but the timing was right. This led to a Commodore re-think. It avoided the codename of TED because the previous use of acronyms had caused problems — PET meant "fart" in French and VIC sounded like something much ruder in German. The range was rationalised and the names changed. The 116, renamed the Ultimax, with its cheap bubble membrane keyboard, never made it to market. The 364, with its numeric keypad, was scrapped. And the 264, with its four built-in applications, became the Plus 4.

This may well have been because Commodore knew that the Plus 4 alone wasn't strong enough to take on its rivals. MSX was perceived as a real threat, Tatung had the new Einstein and Amstrad had the CPC464. The Voice hardware was poor so attention was turned to the predictable combination of word processor, spreadsheet, database and graphics program. This decision missed the point entirely because most people bought a Commodore for games and these needed the hardware sprites of the 64.

In many ways the Plus 4 wasn't as good as the 64. But what it did have was a 7501 processor (based on the 6502) running between (a now unbelievable) 0.89 and 1.76MHz and 64K RAM (with 60K available to Basic; a huge improvement on the Commodore 64's 38K). There was also screen

windowing (albeit only in software), a help key (which almost no software used), eight function keys, 16 colours at eight brightness levels to give 128 colours, and, of course, Commodore's strange system of mixing graphics and colours in text strings.

A vastly improved version of Basic was supplied. It replaced the PEEK and POKE system of addressing screen memory by writing directly to memory with proper Basic commands to draw lines and shapes and to fill them. This enabled high-resolution plotting on the 320 x 200 pixel screen and allowed you to split screen modes between graphics and text.

Sadly, the Plus 4 had some problems. It was supposed to use Commodore 64 and VIC peripherals, such as the cassette recorder and disk drives, but the slimline

case of the Plus 4 didn't have enough space in the back for the necessary connectors. Commodore ended up using smaller plugs, which meant none of its existing hardware could be plugged in. Even when a version of the machine was finally put in a Commodore 64 case, which was big enough for the old-style connectors, the small ones were retained.

Commodore only managed to recover from this fiasco because it got lucky and bought the company that designed the Amiga and which it milked like crazy

before its demise. It's possible that Commodore would have died anyway with the

coming of the PC because the management was, at best, inept. But the Plus 4 was just one example of how a basic lack of market understanding killed the company. It's a shame.

At one time, Commodore's PC division was the second largest microcomputer company in Germany; only IBM was bigger. The name was sold to Escom which later killed it off, but rumours abound that Commodore will be back. ■



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Roldec	384/7	Technomatic	470/517	Fox Computers	389/3
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Visioneer	76	Byte Direct	417/421	Multimedia Direct	380/3
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Win an ADI Duo Multimedia Pack

Ya-ba-da-ba-Duo! Tired of those plain, dull-looking monitors? We bet you are! Well, now you can move swiftly into the future and beyond, by entering this month's PCW Competition to win a 17in multimedia monitor, and more.

ADI is offering two complete Duo Multimedia Packs as this month's prizes. These space age monitors also come with a nifty keyboard and a funky little mouse that would make The Jetsons proud.

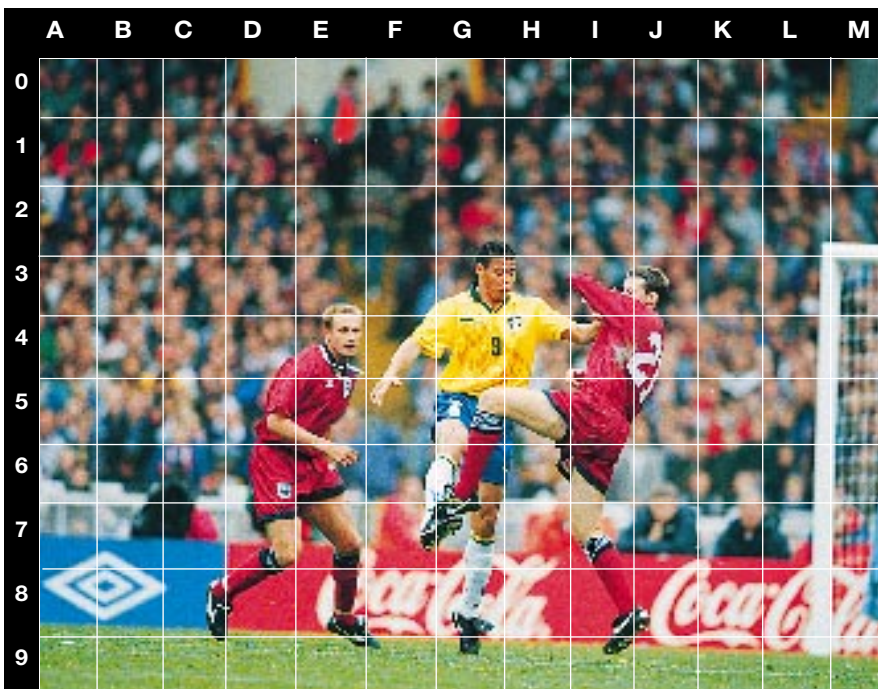
But looks aren't everything, and behind the futuristic design lies a powerful multimedia tool. The 17in plug-and-play monitor incorporates some of the most advanced technology around. The Duo comes with a flat screen, Invar Shadow Mask, and anti-static and reflection coating. Add to this the built-in microprocessor technology that provides autosizing and centering across all graphics modes up to a maximum resolution of 1280 x 1024, and you've got yourself a great device.

ADI has also included its DuoSurround and DuoDome Stereo Speaker system as well as an integrated microphone and headphone facility. The keyboard comes

with all the expected buttons plus an ErgoPad wrist-rest to help reduce strain.

The Duo Multimedia Pack is currently selling for about £555 but you could get it

for free! All you have to do is enter this month's competition, either by post or through our web site, and a Duo could be yours. To enter, just spot the ball in the photograph (left). Please do not mark a cross — just tell us what the grid co-ordinates are.



How to enter

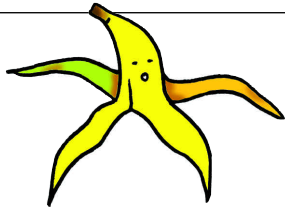
Send your grid co-ordinates, with your name, address, and daytime telephone number, to: PCW March Competition, P.O. Box 11312, London WC2H 0DJ. Alternatively, enter the competition via our web site at www.pcw.vnu.co.uk. **Please do not send direct email.** Entries must arrive by 20th March 1997.

If you do not wish to receive promotional material from companies other than VNU Business Publications, please say so on your competition entry.

Rules of entry

This competition is open to readers of PCW, except for employees and their families of VNU Business Publications and ADI. The Editor of PCW is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

ChipChat



Oops!

■ Last month, the wrong photo accompanied the winning caption for our December Caption Competition. The correct photo and caption should have been:



"Despite Madge's coaching, few Womens' Institute members made it across the slime pools in non-virtual Doom." Submitted by Tom Bell-Richards. We apologise for any confusion this may have caused.

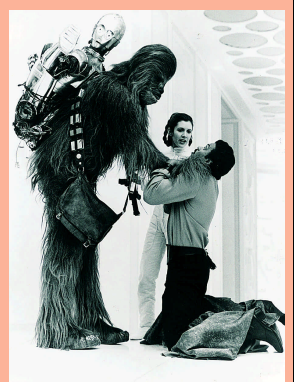
Caption competition



"Roger's new Ultra Ergonomic chair from Facilities Management wasn't quite what he expected."

Congratulations to Kharding Lavender Leas who won January's caption competition with this:

"I'm sorry I didn't tell you about the new MMX-based PC when you bought your so-called state-of-the-art Latest Pentium PC."



Think you can do better? Email captions@vnu.co.uk, enter via our web site, or write to the usual PCW address with your own captions on a postcard marked "Caption Compo" before 17th April. We'll print the funniest entry and the winner will receive a £20 book token.

Mythical tales

A programmer once worked on a form letter generation program for a bank, which wanted to send out a special, personalised letter to its richest 1,000 customers.

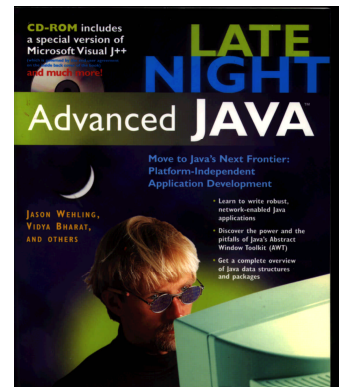
Unfortunately for the programmer, he didn't adequately debug his code. Even worse, the bank didn't bother to check the first batch of form letters.

The result: the wealthiest 1,000 customers of the bank all got a letter that began "Dear Rich Bastard."

With thanks to Steve Oualline.

Secret lives

It seems our very own managing editor, gorgeous, pouting PJ Fisher (right), has been moonlighting from PCW. He was seen furtively attempting to hide the new office copy of *Late Night Advanced Java* from prying eyes. Luckily, our trusty features editor, Gordon Laing, intercepted the culprit and alerted the proper authorities. Upon inspection we discovered none other than PJ himself modelling on the cover! That Ben Tisdall-style goatee won't fool anyone, Paul.



PHREAKS

